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An Address.

POLITICS AND THE MEDICAL PROFESSION.¹

By JOHN DALE,

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POLITICAL problems are at present of great concern to the medical profession. We are jointly responsible for a special function in society, and the framework or pattern of society has recently changed or is changing in some parts of the civilized world, has been almost destroyed in others, and is threatened with changes even in countries that have not been directly involved in the war. "The medical profession and the changing order" is, I see, a favourite heading nowadays for articles and addresses.

Changes are, of course, always taking place more or less evidently, more or less rapidly. We may be thankful, I think, for the relative stability or inertia of Nature in general—that the earth holds its course round the sun and spins so sweetly and rocks with such gentle regularity. At least we can count upon spring and autumn, daybreak and sunset. Rainfall, unfortunately, is less reliable, particularly in our part of the world; but on the whole we are grateful to Nature for her orderliness—the overall stability of her relationships. We may even accept as a fact that human nature does not change, at any rate within periods that concern us as individuals. But human behaviour and relationships certainly do.

¹ Read at the annual meeting of the Victorian Branch of the British Medical Association on December 5, 1945, at Melbourne.

Social changes, changes in human relationships, are due, I suppose, mainly to the growth of knowledge—science, that new force or power which has come into existence by the activity of the human brain, and which, being at the service of men's desires, has come to the point of challenging and controlling the forces of Nature themselves. Man's increasing knowledge enables him to do new things and to do old things in new ways, and it is these changes which are affecting social relationships.

Consider for a moment the changes in such fundamental activities as communication, from gesture to the wireless telephone; locomotion—from "footslogging" to riding in rockets; or the use of tools—from the shaped flint to the cyclotron, whatever that is. Small wonder there are changes in social relationships! The same man, the gregarious mammal with the big brain, uses new tools and methods and an ever-increasing experience to gain the same old ends.

It is worth while, I think, to remind ourselves that mankind over the world is the same animal species, of very many varieties and races or strains, greatly mixed and jumbled up, subdivided into communities or nations mainly on the basis of geographical, racial and linguistic divisions, though it is said that one of the main purposes of frontiers nowadays is to define areas of debt. The frontiers of nations do, of course, alter as a result of wars and fusions; but they show a reasonable stability, nevertheless, often extending over many generations. Most of you, I imagine, were born and will die as Australians in Australia—speaking Australian! Social relationships within the various nations are of various patterns, roughly similar within the areas of the globe occupied respectively by the three great varieties of the human race. Our pattern is naturally of the white or Indo-European, the variety that has been since historic times most active, curious and adventurous, and has become

dominant over so much of the globe. Ours is a European—a British—society. Its stability is largely determined by our social traditions, our general acceptance of certain codes or rules of behaviour enforceable by various sanctions and eventually by physical violence. The codes and laws safeguarding our persons and property (some of which regulate or closely concern the work of doctors) are reasonably acceptable and are constantly under political revision as we discover new ways of robbing or interfering with each other.

In more recent times an increasing number of activities, including some branches of medical practice, have been organized politically and are controlled by laws and regulations which are now legion.

Into these continually changing or evolving societies is born ever the same old Adam, with the same physical needs, the same mental dispositions and urges. He has to be, or at any rate is, educated or conditioned to fit into society, to control his urges and to observe the codes, and for the most part to regard life not as a joy, which is his natural tendency, but as a burden, as a painful, anxious, competitive struggle.

Of men's basic physical needs we can say that they are now understood and that the supply of adequate food, clothing and shelter should be accomplished with ease in many communities. The satisfaction of man's mental or psychic needs is a much more difficult problem. We cannot claim fully to understand these needs. We must, I think, agree that in the nature of things we never can understand them completely. I have heard one of our leading members question whether there was such a thing as a science of psychology, and have seen the same doubt expressed in the introduction to a recent text-book thereon. You will agree with me, I hope, however, that the work of men like McDougall and Freud has given us at least some valuable working hypotheses—the tentative framework of a science.

I believe, anyhow, that among the psychic needs of gregarious man great importance attaches to the twin dispositions of self-assertion and submission. In general, a man must find opportunity to "show off" and to admire. He must feel that he is somebody of importance. He must "cut a dash" if he can. The attracting of attention is essential for the building up of the "precious self" of McDougall. Without an innate disposition to self-assertion or display there could be no inferiority complex, and what would the robin do then, poor thing?

In trying to get a general view of society I at least cannot do without this innate disposition. I believe that the urge of self-assertion is a mainspring of behaviour and that it may be satisfied in ways that are good or bad; but satisfied it must be. Among the good ways are to be included, I submit, the exhibition of skill in the sciences, arts and crafts and in useful and recreative activities. The bad ways are those of the bully. To put it in other words, the necessary submission of others may be induced by persuasion or by violence, and among the "bad" men are to be included, as a general rule, the rulers and men usually called great. There can at least be no doubt that the exercise of power over others is a very effective mode of self-assertion, and history is largely an account of the exploits and powers of great conquerors and rulers, Cæsars, kings, emperors, moguls, shahs and khans—totalitarian rulers all, with powers of life, death, banishment, confiscation *et cetera*. Anyone who challenged their power was a traitor if he failed, but became the *Führer* and very highly respected if he succeeded. Our ancestors are credited—perhaps correctly—with a proud record of struggle against the despotism of their rulers, which is said to have led eventually to the present system of parliamentary government, called, or rather miscalled, democratic; for under it the sovereign people have never been truly represented, and parliament has been to a large extent a battleground for vested interests and a camouflage behind which the real power-holders—namely, the creators and controllers of money—have succeeded in ruling the nation.

Perhaps the most hopeful or encouraging aspect of British history has been the extent to which local responsi-

bility for the conduct of communal affairs has been developed in Britain, in the United States and in the British dominions, though its value also has been largely discounted by the secret overlordship of the financial magnates. To all appearances indeed democracy may be said to have failed; but, as in the case of Christianity, it may truly be said that it has not been tried.

I wish to emphasize that in so far as elected representatives have had real power, their activities have been in a sense misdirected by the tyranny of the word "government". A governor issues his commands. We are the government—let us go to it, boys, and boss the show! The word ought to be dropped. Government policy indeed—in a democracy! Eventually, no doubt, human beings will come to persuading their wisest men to manage their communal affairs and will not, as at present, choose from a roster of in no wise "reluctant dragons" those who make the most alluring promises or those who seem likely to do the least harm.

I have hurried over these points in the history and development of social organization in an attempt to make a background for the present chaos in human relationships, both intranational and international. The bewilderment and uncertainty that are evident in all lands are, in a sense, an expression of frustration, a reaction to the paradox that in spite of growing understanding and humanism, and in spite of the enormous increases in productive power, the world has experienced two terrible wars and a world-wide depression, and the people have lost all sense and almost all hope of security, peace and happiness. The vast increase in our capacity to supply our needs surely needs no emphasis. I should like to quote again the statements of two successive presidents of the Royal Society of about ten years ago, Sir Gowland Hopkins and Sir Robert Ewing, who made respectively the following statements: "Science has repeated on the grand scale the miracle of the loaves and fishes, but they are not being distributed." "Science has brought mankind to the gates of the Promised Land; we await a people ethically prepared to enter in." The frustration illustrated in those statements may, I think, be explained by the fact that behind the façade of democracy the leading nations have been in fact governed by power-mongers—by bad men!

It is small wonder, in the circumstances, that recent times have shown so strong a trend towards socialism, that ideal of society in which competitive private enterprise will be eliminated and replaced by communal undertakings, and in which the allegedly shameful motive "profit" or "advantage" will be replaced by that of "service"—blessed word. It is distasteful to argue the case against socialism, so many of the advocates and supporters of which are undoubtedly inspired by the highest ideals. Theoretical socialism is a picture of the brotherhood of man in action, and eventually, I believe, human beings will give effect to the slogan "to each according to his need and from each according to his capacity". I object to the socialist proposals because they would, in my opinion, lead infallibly to the further centralization of power, and would, therefore, prove to be a brake upon progress. For it is inherent in the nature of man that, as Lord Acton said, all power corrupts, and that you cannot enforce the brotherhood of man or make him good by legislation or by threats of punishment. You can perhaps approach these ends by the force of example, by a new approach to education, by encouraging the use of man's reasoning powers in the hope that reason will enlighten self-interest, and by giving him in his early years the experience of the joy of creative activity, of aesthetic appreciation and of personal responsibility in community.

I agree with those who assert that the world is at present a battleground between two opposed philosophies—on the one hand the philosophy of collectivism, under which the individual is subservient to an abstraction called the state, which in reality is represented by human beings, and on the other hand the philosophy of freedom, which aims to secure the utmost development and liberty of each precious unique individual.

The present chaos is really a phase of, or rather an acute crisis in, the age-old struggle of mankind for freedom, which is, according to General Smuts, "the most ineradicable craving in human nature". You remember the story of the Chinese woman mourning the death of her son who had just been killed by a tiger. Her husband and her father had lost their lives in the same way. Why did they live in that dangerous wilderness? "Because", she said, "there is none here to oppress us." Freedom must be anathema to those whose self-assertion is based, or seeks to base itself, on power over their fellows, and it is no new phenomenon that they propose to use their power in the interests of their victims. May we be at length delivered from those who are sure they know what is good for other people.

The ideal in human relationships, that which has most appeal and is generally accepted as right and good, and which wins, so to speak, the ethical stakes, has been defined for us by the great teachers and philosophers and is not open to serious challenge. It is embodied in the Golden Rule and in the commonly accepted notions of justice, fairness and the brotherhood of man. The schemes of our modern planners are not in accord with those ideals, and I make no apology for saying so, for I have been doing so for years, long before our profession became so urgently involved in the schemes of the planners.

May I emphasize again the gravity of the present crisis? Human relationships the world over are truly chaotic. The situation is to all appearances just the one for which the planner craves, and from all sides comes the cry for the enforcement of a new order. But do not let us lose sight of the fact that the framework of our extremely complicated society is still in most places reasonably intact, that the cows are milked, the bread is baked, the letters are delivered, and that all those who have found a reasonable means of self-expression and a reasonably satisfactory measure of self-respect in "the daily round, the common task" are quite willing to go on doing their jobs.

Consider now the manner in which we as a profession are involved in this crisis. It is clear that in the first place we are required by the planners to perform services essential to them in the establishment of their brave new worlds. In the second place we, as a privileged body, especially trained and equipped to understand the nature and needs of mankind, owe a duty to our fellow citizens to advise them of the possible effects on their health of the changes to which they are asked to submit. All proposals made to John Citizen are recommended to him as benefits. He is told that if he does or accepts this and that he will be better, his health will be improved, and it is up to us to express our approval or disapproval as our knowledge and conscience dictate.

With regard to the question of nationalization or socialization of the medical services, this has already, during the present century, been effected to a large extent in a number of European countries, including Germany and of course Russia. More recently attempts have been made to bring it about in Great Britain, Australia, South Africa and the United States. The variety of sources from which it is advocated is quite remarkable. You would not at first sight have expected the late Conservative Government in Great Britain to be making proposals similar to those made by the Labour Government in New Zealand, nor would you perhaps have expected our Mr. Menzies to be agreeing with Mr. Curtin that the Commonwealth Government should provide a "national" health service for the people. You would not have expected its advocacy within the United States, and yet officials of the great public health service in that country are advocating it freely. Joseph W. Mountin,⁽¹⁾ Medical Director of the United States Health Service, for example, writing on "Medical Care: Private Enterprise or Social Service?", points out that even in prosperous times a substantial proportion of the population is not self-supporting, and demonstrates that the low-income States have, per 100,000 of population, less than half the number of hospital beds and physicians in the wealthy States. The remedy for poverty is, apparently, to supply more hospitals and doctors! Dr. Mountin perorates on the results that are in

sight "should health become one of our chief social objectives when the energies of the people can again be diverted from war to the pursuits of peace". He seems to envisage a valetudinarian world. An appropriate comment is, I submit, that health, properly conceived, is the only possible social objective.

In an address entitled "Hospitals in the Public Health Panorama", Warren F. Draper,⁽²⁾ the Deputy Surgeon-General of the United States, says: "If health services both preventive and curative are to be distributed equitably to entire populations, there is need in each country for a comprehensive national health service organized in the public interest. There should be a central or Federal health agency responsible for all aspects of national health." Mr. Wendell Berge,⁽³⁾ Assistant Attorney-General of the United States, under the title "Justice and the Future of Medicine", writes as follows: "Institutions of some sort must be set up to serve each of the great needs of life, a people must be fed, given laws, protected against the weather, held to a moral code, provided with escapes from the dullness of everyday existence, fitted out with the comforts and frivolities that make life worth living . . . Now the health of the people is among the mightiest of these great tasks." Later in the same very interesting address he states: "The universal demand that the common health be served cannot much longer be stayed; a new medical order is inevitable."

President Truman is quoted in the Press as saying that the high percentage of rejection for the forces was due to the fact that medical services were not equally available to all. Britain's Prime Minister, Mr. Attlee, spoke recently as follows:

What is it we seek? A service which will be comprehensive in the double sense of being available to every member of the population and of covering every form of medical and allied activity. We intend to have a service in which no patient shall be without the treatment he needs through lack of money, and no patient shall be without the treatment he needs through deficiency in, or lack of organization of, the necessary facilities. We need, too, a service in which professional men and women will be able to devote themselves to their great calling without financial anxiety and without in any way feeling cramped and over-controlled by regulations.

We need great improvement in our hospital service, in the facilities for diagnosis and the treatment of the sick outside hospitals, in number and distribution of medical men, both consultants and general practitioners, and, perhaps above all, in planning and organization of all the different branches in what must, in fact, be a single integrated whole, a real national health service. The task is not easy, but we are going to do it.

We are also informed from a variety of sources that "industry" demands an adequate medical service and that "labour" also demands it. The reasons proffered for these proposals are, of course, various. In a socialist economy, as in Russia, the nationalization of the medical service may be taken as a matter of course. Sometimes the changes are urged, as by our friend Dr. A. E. Brown, on purely humanitarian grounds, and to this we can take no exception, though we may well debate their validity.

The financial reasons for a socialized service are quite spurious. The people cannot themselves afford to pay for a medical service, so it must be provided for them; and the "funds" must be protected. But the people will still pay for it, and until we take the trouble to investigate and understand the nature and functions of money we are indeed likely to be fooled by those who insist that we must accept what we don't want, or something inferior, because of lack of the mysterious object "money". The experiences of the war have given a bad jolt to those who used the money bog as a means of coercion; but so long as we refuse to study the subject we shall always be open to deception. I was interested to read a discussion by Dr. A. E. Brown of the method of payment by capitation fees. He made the following statement: "Should an epidemic occur, the extra cost of it falls not on the fund but on the doctors." "But under the fee for service principle", he continued later on, "any increase of demand by the

public on the medical service provided, whether legitimate or frivolous, falls on the fund . . . It is no matter for wonder that this system has little appeal for treasuries and those responsible for the financing of it . . . If the extra cost falls on the doctors, it is just too bad; but it must not fall on the funds! The economic arguments are specious and acceptable only if we agree to the policy of central planning and authoritarianism; if we agree that we, the State, should provide everything, including medical services for the people; if we are willing so far to betray our trust as to agree to become a veterinary service.

We must regard it as a duty to instruct the public as to the true nature of health, which is a favourite topic of mine and one upon which I have already ventured to address you. The word is used in several senses, and you may remember that I suggested as an overall definition of health that it is the "quality of life"—a meaning which becomes evident when we ask the familiar question: "How are you?" In very simple words one might say that your health is "how you are", just as one can reasonably define money as "what you buy things with". Grave misunderstanding arises from the careless use of the word "health"—a carelessness of which members of our profession are often guilty. When my friend Dr. Byrne,¹⁰ for example, in his most valuable book "Proposals for the Future of Medical Practice", starts off by saying that the four necessities of life are food, shelter, clothing and health, it is reasonable to ask oneself what he means there by "health". He goes on to say that the first three have an intimate bearing on the last; but even so it is difficult to answer the question. The proper appreciation of the nature of health is especially important because it puts the doctors, so to speak, in their proper place, and makes it possible to understand the fact that health is dependent far more upon economic factors, social relationships and education than it is upon medical services. Both public and politicians are at present far too inclined, when they are confronted with problems of health and sickness, to think at once of the doctors as able to deal with the problem. If *salus populi* is *suprema lex*, then the political planner or dictator, with tongue more or less in cheek, must have a medical service at his disposal to ensure it. What he needs, of course, is a medical *Gestapo* to prevent malingering, to ensure that sickness will not become a "gainful occupation" and to protect the "funds".

I assume that I have your agreement in stating that what I have called mental factors or social relationships are of immense importance in influencing the well-being of people, right up to the frequent occurrence of organic or somatic disturbance, and that, in determining not merely the presence or absence of physical symptoms, but the actual quality of life, they are of far greater importance. I assert that a slave cannot be well, or an unhappy person, or for that matter a wicked one—one who transgresses the recognized ethical principles, who has no regard for the rights and property of others, who deceives and takes advantage of his fellows. Current business morality is surely incompatible with health. I am reminded of the example of the successful salesman, the professional liar, who excels at his job. I submit that such a man cannot be well.

I nearly attempted to regale you, by the way, with a dissertation upon the power of goodness, and I do ask you to reflect on the influence of business in the world today, and on the part played in social and political affairs by business and by "practical" men. Look around you for a prominent man who by his deeds, his utterances and reticences clearly qualifies to be called good. Offhand I can think only of Ghandi.

We must distinguish the part which doctors and the medical services can play in relation to health. Though clearly subordinate to lack of means, education and liberty, lack of medical care is of importance, and we heartily agree with all those humanitarians who desire to see medical care of the best current quality given to all our fellow citizens. But medical service is not a clearly definable, simple thing, like for example water, for the distribution of which you can "organize" a "system". It is

not a thing at all. It is an activity, an interaction of men, growing and varying at so many points in response to varying needs and growing knowledge that to attempt its organization and control would, I suggest, alter its nature altogether, and for the worse. Its activities are such as to evoke and sustain the goodness of those who practise it. Its value depends largely on their goodness. In so far as medical services are impersonal and depend upon the supply of material, facilities and equipment, they are and have been constantly and rapidly expanding and improving, and over the years the corporate profession has made many proposals and plans for improvement and has often approached governments with offers of consultation and advice. It has often been met with the reply that there were no "funds". Such parts of medical work as already have been nationalized—and they are numerous—have been maintained at what we must agree is a poor standard, in spite of frequent efforts on the part of the organized profession to have improvements effected. And now we are confidently told that medical services in general must, as a matter of urgency and for the sake of efficiency, be nationalized. Small wonder we smell a rat, a very evident and odoriferous rat. If we swallowed the bait of security, the bait of commissions in the Great Regimentation, we should, I suggest, be false to our traditions and to the trust which the people repose in us as individuals.

The existing services are capable of many improvements, but we need not be ashamed of their achievements in recent times. Even with the admitted failings, shortcomings and maldistribution of private practitioners and specialists, the services that are really essential and the recent great advances in life-saving drugs and techniques have been made generally, and on the whole readily, available. Even the poorest get their insulin and penicillin. Improvements can, of course, be made, and doctors willingly cooperate in making them, but not, I hope, at the expense of the development of medical science or of the liberty of the people.

The plain fact is that the modern "trends" are all in the direction of centralization of power, in politics, in industry and in labour organization. We must, we are told, take a "truly national" outlook and hand over the management of all our affairs to certain people in Canberra. State governments are no good, and to the extent that they have no money, that is true. They are largely futile, so we must take a "truly national" view and hand over the management of our affairs to those at Canberra who have the money. By holding the "funds" they hold the whip hand. But the centralization of power is so bad, so flatly opposed to liberty and human progress, that we must insist that they make the money, which is our money, available to us to spend as we ourselves desire, that we may learn by our mistakes and develop our freedom and responsibility. It seems, by the way, that in the existing fog which surrounds the subject of money, it is by no means certain that those at Canberra can be assured of adequate supplies for the needs of the country. Even they are threatened, under the Bretton Woods proposals, by the dominance of an international body; and if that happens we shall be invited to make further sacrifices and to think internationally, to take a truly international view, and to be ashamed of wanting to be merely Australians. That threat, by the way, is still very real.

I conclude by urging that we shall oppose the centralization of power, because it is wrong in principle, because it inevitably leads to loss of liberty, and because liberty is essential to health. "Freedom for doctors as individuals" is an excellent basic policy for the medical profession. We must retain our individual liberty as doctors in order to safeguard that of our fellow citizens. The planners who would enslave them—for their own good, of course, Hitler-wise—need our services to carry out their designs, and I believe that we are in a special sense the guardians of liberty—a rock which will, I hope, stand firm against the onslaughts of the planners.

"Guardians of liberty" sounds horribly rhetorical, but I hope it is appropriate. Our ethical traditions are admir-

able. May we live up to them even more closely in our increasing role as teachers! We must counter the demand for nationalization by demanding for the people the things which we know are really essential for their health—child welfare, a vastly improved educational service, a basic income as a right for every citizen, and the utmost decentralization of responsibility. Finally, I venture to quote again Sir Robert Ewing's statement, "Only a people ethically prepared to do so can enter the Promised Land", and suggest that the speed of that essential preparation will depend on the conditions prevailing in the new schools which I hope we are going to have.

References.

- ① J. W. Mountin: "Medical Care: Private Enterprise or Social Service?" *Public Health Reports*, Volume LIX, 1944, page 1405.
 ② W. F. Draper: "Hospitals in the Public Health Panorama", *Public Health Reports*, Volume LIX, 1944, page 513.
 ③ W. Berge: "Justice and the Future of Medicine", *Public Health Reports*, Volume LX, 1945, page 1.
 ④ C. Byrne: "Proposals for the Future of Medical Practice", 1944.

A CASE OF SO-CALLED HYDROPHOBIA: A MATTER OF DIAGNOSIS.¹

By W. E. L. H. CROWTHER,
Hobart.

LOOKING back over my university years, I remember especially three books. They were Osler's "*Æquanimity*", "Tess of the D'Urbervilles", and "The Life of Louis Pasteur" by his son-in-law, R. Valléry-Radot. "Tess" we read at the wish of the Master of Ormond, Sir John McFarland; the writings of Sir William Osler awakened an interest in medical history and literature that still remains; and it is possible that the vivid description of the conquest of rabies by Pasteur is responsible, in part at least, for this paper. The appeal of both personal and scientific aspects of Pasteur's life was profound. Who can forget the suspense and drama of the first inoculations for hydrophobia, when nine-year-old Joseph Meister was brought to him at Paris? Or the greater triumph, when the heroic boy Jean-Baptiste Jupille, to save his playmates, beat off a mad dog with his bare and lacerated hands? This boy six days later was brought to Pasteur, to be saved by him, and later honoured for his sublime courage by the *Académie française*.

By so much, then, had Louis Pasteur become part of the background of at least one medical student that, having to return unexpectedly to Tasmania in the late autumn of 1911, I contrived to leave the train at Paris, when en route for Marseilles. There in the crypt of the Pasteur Institute is the tiny chapel in which he rests with Marie his wife, and it was to this sanctuary that I went first on the morning of my arrival.

Again, often in boyhood I had heard my father describe the horrors of rabies, of which he had had considerable experience when a student at Guy's Hospital, and after graduation at Aberdeen, and when in general practice in Lincolnshire. He confirmed the popular belief that the sound of water being poured or splashed, even if not actually in the sick room, would at once bring about a return of the dreaded convulsions.

The foregoing will explain this attempt to describe a case of rabies or hydrophobia, said to have occurred in Hobart Town as long ago as February, 1867. For the essential details I have relied on the columns of *The Hobart Town Mercury* of the period. Those concerned have long since gone to their rest; but of them Dr. Thomas Christie Smart, Sir James Agnew and Dr. Richard S. Bright were alive in the nineties, and as a small boy I remember

them well. Dr. Smart¹ was a tall man of distinguished appearance, who lived just above us in Macquarie Street. He was for many years an honorary medical officer of the Hobart General Hospital, and for sixteen years before his death in 1896, chairman of its board of management. His memory is perpetuated by a brass memorial tablet in the hall of the Royal Hobart Hospital. Sir James Agnew² had been eminent in the medical and political life of the colony for most of the Victorian era, and for a period its premier. To him Sir John and Lady Franklin confided the task of guarding the well-being of the Tasmanian Society, from which was evolved our Royal Society. This charge he carried out most faithfully, acting for many years as its secretary and vice-president. Sir James Agnew I remember as a very old man, who always dressed in perfect taste. He had a great natural dignity of character, and represented all that was best in our profession, both to his contemporaries and to those that were to follow him. Dr. R. S. Bright³ lived into the new century and died in harness. I was his patient during the great typhoid epidemic of 1898. Short and thick-set, he was abrupt and quick-tempered, but when his armour had been penetrated he inspired great affection and respect. My friend Dr. W. W. Giblin has told me that shortly after Bright commenced practice in Hobart Town he was attending a patient in lower Davey Street, nearly opposite "Heathfield". During the long illness he had walked to and from the house as he made his rounds on foot. After the recovery of his patient he was asked to call at her home at a stated hour—say 11 a.m. To his surprise he found all the family assembled, and he was formally thanked for his care and attention to her. That done, the head of the family took him outside to where a smart and attractive horse and trap were standing, and these he was asked to accept as a mark of their gratitude. Dr. Bright himself told Dr. Giblin of this happening.

The other medical men whose names will be mentioned in this narrative are known to me only by hearsay. The niece of one, Dr. John Doughty⁴ I met as long ago as 1915 at the Convent of the Blue Sisters at Fiesole, near Florence, where we, a group of convalescent officers, had gone to see the Christmas "crib". This lady, one of the sisters, finding I came from Tasmania, mentioned that her uncle had been in practice there many years before. Dr. E. Swarbrick Hall⁵ was a physician whose work and character are still kept in memory. He was perhaps the most prominent Roman Catholic layman of his day, and it is only a few years since the last of his venerable sons and daughters died. Several of the latter were sisters in religious orders. His remarkable work as Australia's first sanitarium was first placed on record some twenty years ago (J. H. L. Cumpston, 1923). Of my grandfather, who will make a brief appearance towards the close of this sad story, I have written more fully elsewhere (W. E. L. H. Crowther, 1942).

From the foregoing it will be understood that the practitioners who were concerned with the illness of the boy

¹ Dr. Thomas Christie Smart, Fellow of the Royal College of Surgeons of Edinburgh, came to Van Diemen's Land on May 27, 1842, from South Australia via Port Phillip. He was for some years an assistant colonial surgeon, then practised in Hobart.

² The Honourable Sir James Wilson Agnew, K.C.M.G., emigrated to Van Diemen's Land in 1841. He was a Member of the Royal College of Surgeons of England (1838) and a Doctor of Medicine of the University of Glasgow (1839). He was assistant colonial surgeon and afterwards in private practice, and premier and chief secretary in 1886. In the year 1888, at his own expense, he landed 400,000 salmon ova in Tasmania and established these fish in our waters.

³ Dr. Richard Stonehewer Bright was born in London in 1835; he was a Member of the Royal College of Surgeons (England) and held the Licentiate in Midwifery (1857) and the Licentiate of the Society of Apothecaries (London, 1858). He began to practise in Hobart Town in 1859. For over forty years he was an honorary medical officer at the Hobart General Hospital, and until his death president of the court of medical examiners.

⁴ Dr. John Doughty, Member of the Royal College of Surgeons, arrived in Van Diemen's Land about 1840 and commenced practice in Launceston. After a visit to England he moved to Hobart Town, where he acted as surgeon to the Volunteer Artillery Corps. His death from apoplexy took place on March 13, 1868, in his forty-ninth year.

¹ Read at the seventh annual meeting of the Tasmanian Branch of the Royal Australasian College of Physicians on April 14, 1945.

Bowring and involved in the controversy as to the nature of the disease from which he died, were men of considerable experience and judgement. So much having been said, it is now time to consider the clinical features of this extraordinary case.

On the morning of February 18, 1867, there appeared in *The Hobart Town Mercury* the startling announcement that "a case of hydrophobia, the first we believe to be recorded south of the equator, has just occurred in the city". This was followed by a description of the case in considerable detail, a notable example of the admirable reporting to be found in the daily papers of the period. Indeed, it may well have been inspired (or even dictated to the reporter concerned) by the physician who had been in charge of the deceased child. Here are the principal features. A month previously, a boy named Bowring had been bitten by a half-bred spaniel whilst playing in a yard. This dog, the property of a neighbour, "observed



FIGURE I.

Dr. J. W. Agnew about to set out on his round, circa 1860.

lately to be very vicious", was fighting another, and in attempting to separate them the boy sustained a deep laceration of the lower lip. The account continues as follows:

Dr. Smart was sent for and closed and dressed the wound in the usual manner and in the course of a few days it had healed up scarcely leaving the sign of a scar. On Thursday last the boy became ill, the next day he complained of headache and his mother observed that he swallowed an aperient draught with very great difficulty, staring wildly and spilling a portion of it. On Saturday morning Dr. Smart found the case to be one of thoroughly developed hydrophobia, the patient suffering under the most severe paroxysms peculiar to that disease when offered fluids or attempting to drink. He continued in this condition throughout the day, every movement in the room or breath of air throwing him into the most extreme state of agitation and suffering, with total inability to swallow the smallest particle of food or drink. By Sunday morning he became eager for food and drink, struggling under the most violent convulsions and calling on his mother to hold him tight, while he endeavoured to drink. In the course of the morning he became rapidly worse, growing wild and excited and a large quantity of frothy saliva issuing from his mouth. In this condition he continued until about 2.30, when he expired in his mother's arms, having a few minutes before that calmly said that he would die.

The report went on to state that during Saturday the boy was seen by Dr. Agnew with Dr. Smart, and on Sunday by Dr. Agnew, Dr. Hall, Dr. Bright and Dr. Doughty, all of whom concurred as to the nature of the disease. The contribution concludes:

We may mention that about a month ago a dog answering to the description of that which bit the boy was brought by a man to Dr. Doughty for his opinion, and from certain appearances which he observed he pronounced it to be unsafe and recommended its immediate destruction.

The *Mercury* of that date was a large sheet of four pages. It was almost entirely taken up with local and Australian news and domestic affairs. Fenian excesses and a small war with the Maoris were the highlights; no hint as yet of such a nightmare as total war. So it will be understood

with what anxiety, and indeed horror, the news of the advent of the dreaded hydrophobia would be received. Two days later a letter was printed in the *Mercury* under the cipher "O". The writer, while accepting the opinions of the physicians concerned, commented: "No remedy was applied and the disease allowed to take its fatal course for the reason perhaps that it has generally been looked upon as incurable." Pointing out the value of the vapour bath in such cases, while regretting he cannot give his authority for this cure, he comments: "Haply some of your readers may point it out, as it appeared not long since in some of the English and Colonial newspapers." "O" also makes the point that this is not the first instance of the disease in the southern hemisphere, as it is sometimes met with in Mauritius. A significant observation, as at the time there was a large trade between that island and our own, by means of our local ships.

On February 21, Dr. Smart was again in the Press with a long and interesting letter dealing largely with what had happened to the dog. It commences:

Being now in a position to offer some authentic information respecting the dog by which the boy Bowring was bitten, a month ago, and who died on Sunday last of that terrible disease Hydrophobia, I beg to forward the same for publication should you think the matter of sufficient importance.

The dog, a half-bred spaniel, belonged to Mr. Baker, a neighbour of the Bowrings, and was usually tied up as a

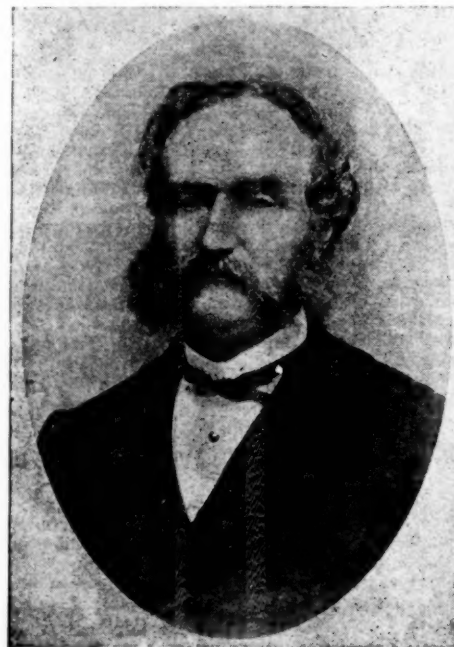


FIGURE II.

Dr. Thomas Christie Smart, F.R.C.P. (Edinburgh).

watch-dog and was a great favourite of Mr. Bowring and his family. "Its general deportment sharp but not vicious." As stated, whilst fighting another dog it bit the boy on his under lip. The same afternoon, Mrs. Baker, the owner's wife, went to Mrs. Bell, an old friend of the family residing near by, and asked her to care for the animal whilst she was away in Sydney. Two days later, whilst being led thither by Mrs. Baker's boy, with a piece of rope round its neck, the dog bit his hand, inflicting a long scratch with its teeth. Having arrived at Mrs. Bell's, it became loose and bit her through her clothing in the knee when she went to secure it. The dog was noisy through the night, and Mr. Bell, in the words of the narrative,

"removed him to the upper part of the garden and secured him to a tree and gave him some food and drink, of which he partook, and on the following morning found him lying coiled up as if asleep, but on examination was found to be dead". Here I must omit some delightful observations as to the character of the dog and disposal of its remains.

Dr. Smart continues with remarks relating to recent actions of the animal, its characteristics and manner of death, and states that rabid dogs after four, five or six days often die without a struggle. The concluding paragraphs of his letter, however, indicate that doubts had already been cast on the correctness of his diagnosis.

It is painful and difficult to bring one's mind to the conviction that so formidable a disease as Hydrophobia has already made its appearance in the midst of us, enjoying as we hitherto have done so complete an immunity from this and other serious diseases common in other parts of the world. Nevertheless the fact is established beyond the possibility of doubt or contradiction, and the inhabitants of the city would do well to look at the question seriously with a view to measures of safety and protection, notwithstanding the fact so generally known, that a member of the medical profession in this town, who did not see the case and therefore can have no knowledge of its true characteristics, has been busying himself for days past endeavouring to throw discredit on the statements of men of acknowledged integrity, incapable alike of deceiving the public or being themselves deceived by mistaking Hydrophobia for Tetanus or Tetanus for Hydrophobia.

Indeed, Dr. Smart had placed himself and his colleagues in a most unenviable position. It would have been time enough to disclose the presence of this disease when its development in the two others bitten by the dog had placed its nature beyond all doubt. This declaration, without reserve, that hydrophobia had occurred in Hobart Town, was later challenged before the Health Committee of the City Council, by W. L. Crowther, F.R.C.S.¹ He had, after leaving Saint Thomas's Hospital, worked under the great Louis Pasteur in Paris, and I am convinced that it was he who thus early had questioned their diagnosis. It is unfortunate that our archives are lacking in the files of the opposition daily paper, or the question might have been easily settled. Be that as it may, in the *Mercury* of February 21 there appeared another "Richmond in the field"—"Veritas" by name. He is in the fortunate position of being able to tell the members of the profession how to act in such cases. This is his infallible remedy, and it certainly sounds efficacious:

... to wash well and as soon as possible the bite with warm vinegar and water and when this has dried a few drops of Muriatic Acid poured upon the wound will kill the poison of the saliva and remove the patient from all present and future dangers.

A correspondent of a different calibre was "Cave Canem", whose letter appeared in the next issue of the paper. He commences by describing himself as being "rather a nervous man albeit a philosopher", and continues by stating that he was seriously perturbed by the announcement of this most horrible of all diseases by the six medical men in attendance, who "by the bye appear to have done nothing to alleviate the suffering of the little patient, not even to the placing of him under the influence of Chloroform"—not, he explains, as a countermeasure, but to alleviate the distress especially of the mind, as the termination approached. He remarks that he is scarcely convinced from Dr. Smart's description of the nature of the malady, and regrets that the advice of a physician recently from England was not sought. He skillfully undermines the diagnosis of Dr. Smart by pointing out that no

further cases of hydrophobia have developed among those injured by or in contact with the dog, as would have been the case had it really been one of "canine madness". The principal sting in the letter is its suggestion that in certain cases the diagnosis of hydrophobia from tetanus can be difficult, and that there are grounds for the reluctance of several medical practitioners to accept as correct the conclusions of Dr. Smart, which doubts, he remarks, appear to have made the latter very irate.

The name of Dr. Valentine appears also over another letter in the same issue. He quotes a Cork paper as republishing a manual of Sir John Fyfe on the vapour and Turkish bath, in which a certain Mr. Urquhart is credited with stating: "I should not mind my own child being bitten by a mad dog, so certain am I that the bath would cure him." He goes on to mention the instance of the only known cure of the disease when "a French physician having been bitten by a mad dog and suffering from the first symptoms of the disease and knowing that medicine was of no avail and thinking of how he could die most easily had himself carried to a vapour bath, there to



FIGURE III.

The encounter of Jean-Baptiste Jupille with the mad dog.

remain till death. He remained until life and was carried out cured."

By this time public opinion in Hobart Town was well aroused, and to allay the grave alarm caused by so detailed a description of the disease, still dreaded above all others in countries where it is endemic, the local authority stepped in. The Health Committee of the City Council, Aldermen Lewis, Belbin and Green, were instructed to investigate the cause of the death of the boy Bowring and to suggest measures to check the spread of the disease. The principal witnesses to appear before the committee were Dr. Smart and Dr. E. S. Hall, and to their long and detailed reports were attached certificates from Dr. Carns, Dr. Agnew and Dr. Bright, concurring in their diagnosis. One or two lay people also gave evidence. Written comments were submitted from Dr. W. L. Crowther and Mr. C. B. Morrisby, of Sandford. The former was handed in as a result of a formal request of the committee by the town clerk.

Dr. Smart was the principal witness, and did not recede an inch from the standpoint he had maintained from the commencement, and to support his conclusions gave a complete and detailed case history of the boy's illness as well

¹ William Lodewyk Crowther, Fellow of the Royal College of Surgeons, son of William Crowther, Member of the Royal College of Surgeons, arrived in Van Diemen's Land in January, 1825, with his parents by the ship *Cumberland*. He returned to England in 1839 and qualified from Saint Thomas's Hospital. He was born at Harlem, Holland, in 1817, and died at Hobart in the same month of 1885. He was sometime premier of Tasmania.

as an exact differential diagnosis of the two diseases in dispute, basing the latter on Holmes's "System of Surgery".

Dr. E. Swarbrick Hall, having declared unhesitatingly for hydrophobia, passed on to give full details of what he considered to be another instance of a dog afflicted with canine madness. This animal had bitten a boy five months before, and although the latter had so far shown no signs of the disease, Dr. Hall considered that he still might do so. The dog referred to had broken its chain and attacked a respectable female (*sic*) in Queen Street without provocation, tearing her clothes greatly as well as those of another female who went to her assistance. It then commenced eating gravel and grass, then bit another dog on the chain, which dog afterwards went mad and died. It then attempted to bite a dog belonging to Bill Moore, a miner, but he anticipated the attack and felled it with a blow from the leg of a chair and killed it. This man, said Dr. Hall, professes to have seen mad dogs frequently in England, and was convinced on first sight of the dog that it was mad. Dr. Hall continued:

The probability is that many more dogs have been bitten and that this terrible disease has got a wider footing amongst us than the case connected with Bowring's death. Any person who saw the agonies of this unfortunate boy and knows how useless medical skill is to avert the fatal results, would not wonder at a practice said to have been once common to put an end to the suffering and danger to others by smothering the patient. As the cattle disease has been stamped out in England by vigorous methods there adopted, so might canine madness be by similar measures here. No time should be lost to kill the thousands of useless mischievous unregistered dogs that roam night and day about our streets and cause so much annoyance and suffering.

In conclusion, he states: "If some steps are not promptly and vigorously taken I fear that Bowring's case will soon be followed by others."

R. W. Carns, M.D., in turn expressed his view that "it was a well-marked case of hydrophobia", and Dr. Agnew was as brief with a curt "Thomas Bowring died of hydrophobia". Dr. R. S. Bright, too, was decidedly of the opinion that "the boy had died of hydrophobia and from no other cause whatever".

Next was read this letter, received, at the request of the town clerk, from Dr. W. L. Crowther:

In reply to your letter of yesterday relative to the supposed case of canine madness or Hydrophobia, I beg to say that not having seen the boy alluded to, I am unable to supply the data required. It may not however be out of place to add that I entertain very grave doubts as to the character of the disease of which the boy Bowring died and I shall require further evidence before I can be brought to the belief that his case was other than Tetanus. I am watching with some anxiety the effects of the bites by the same dog upon the hand of the other boy, who must in the ordinary course of things, if the prognosis in the first case was correct, become Hydrophobic.

The last witness I shall mention was Mr. C. B. Morrisby, a farmer, of Muddy Plains, who wrote to state that a stray dog had come to his place about a month previously. It was stupid and would not eat. When shut up, the dog tore at the place till he got out and bit a sow on the nose. Allow me to quote from Mr. Morrisby's letter:

The dog died the same day. He seemed in great pain towards the last, but appeared to die easily. The sow was taken bad about a week after; at first rubbing her nose violently on the part that was bit. She would neither eat nor drink. She would get anything in her mouth and bite it fearfully. She bit the toe of one of the other pigs and the tail of another. She would run her head in the mud and knock her head against the fence; in fact she was raving mad. Then she got so weak she could not stand. She was very much convulsed and died after being ill about five days.

On March 11 the Health Committee presented their report to the municipal council, and on March 25 it was adopted "and it was ordered that the report and examina-

tions and particulars be advertised in the Mercury newspaper". Here is the report in full:

It appears that the boy was about nine years of age and when first attacked on Jan. 19 was in good health. On that day he was bitten on the lip by a half-bred Spaniel. He recovered apparently from this attack in about ten days. All seemed right, no suspicion being entertained of the dog being afflicted with rabies, but on Feb. 12 (twenty-four days after) he became ill and died after great apparent suffering on Feb. 17, having been greatly afflicted in the meantime by attacks described in the examination and observations of Dr. Smart, Dr. Hall and four other medical practitioners of Hobart Town, which leads us to conclude that his case was one of Rabies or Hydrophobia, for which there does not appear to have been discovered any cure or medical relief and that no case of Hydrophobia has ever occurred in Hobart Town to the knowledge of any medical man there. The Committee in the absence of all remedies for this disease recommend that greater supervision be exercised, by the police, over the many dogs running loose in the town, so that as many as possible of those affected with Hydrophobia or other infectious disease may be captured and destroyed according to orders already issued by His Worship. The spaniel in question was taken from the town and died soon after. To appease public curiosity the Committee recommends that the examinations and observations made in this enquiry be published with the particulars since given and this report of the Committee.

(Sgd.) D. LEWIS,
Chairman.

From this date there is no more mention of the occurrence, and it gave place to other items of local news. So we have to content ourselves with the conclusion of the municipal council that the disease was rabies or hydrophobia, although in the fullness of time neither Mrs. Bell nor Master Baker, bitten respectively on the knee and on the hand, developed the disease. One can imagine, however, the terrible suspense in the two homes concerned during the weeks of waiting. Nearly eighty years after the event, we may assume that the failure of rabies to develop is the final proof that traumatic tetanus was the cause of the most unusual syndrome so ably described by Dr. Smart and Dr. Hall. In view of the whole occurrence, and especially the evidence of the latter, for whose judgement and acumen I have formed a profound respect, it would seem that the tragedy of the death of Thomas Bowring coincided with an outbreak of virulent distemper or other similar disease among the stray dogs of the town.

When the unusual features of this illness are considered, and in such circumstances, it is little wonder that so able a group of experienced physicians were mistaken in their diagnosis. Apart altogether from these considerations, the whole happening is an interesting study of the relationship of an earlier generation of our profession to each other and to the public among whom they worked.

It is in the hope that it will be of interest to the physicians of today that I have attempted to describe this long-forgotten happening.

Acknowledgements.

Some years ago my old friend, Mr. F. J. McLoughlin, who died only recently, laboriously transcribed by hand from an old file of the *Mercury* the long account of these happenings, just because he thought it would interest me. How can one repay such a gentle courtesy? My friend Miss Wayne, too, has once more given me detailed information that was essential, thus adding to the debt I already owe her. Perhaps the affection in which she is held by those who work with her on early colonial history is some recompense.

Bibliography.

- J. H. L. Cumpston: "The First Australian Sanitarian". *Health*, April, 1923, page 89.
W. E. L. H. Crowther: "Some Aspects of the Life of a Colonial Surgeon". *THE MEDICAL JOURNAL OF AUSTRALIA*, September 26, 1942, page 283.

SOME EFFECTS OF BLOOD LOSS ON HEALTHY MALES.

By R. J. WALSH,

Major, Australian Army Medical Corps,

AND

A. K. SEWELL,

Captain, Australian Army Medical Corps.

It is well recognized that the donation of 500 millilitres of blood is without ill-effect on the average healthy blood donor. After blood loss fluids added to the circulation from extravascular sources help to restore the volume of the circulating blood. Erythrocytes are also added from the reserves of the body and at a later stage are manufactured by the hæmatopoietic system. The addition of extravascular fluids is, however, the major compensatory factor, because a deficiency of erythrocytes is well tolerated provided that the volume of the circulating blood is not greatly below normal. As fluids are added more rapidly than are erythrocytes, a dilution of the blood occurs and may be detected by falling hæmoglobin and hæmatocrit values and falls in the number of erythrocytes. It is known that this hæmodilution is not evident immediately after hæmorrhage, but there is little knowledge of the rate at which it occurs. In other words, information is required on the rate at which fluids are added to the circulation.

The investigation reported here was undertaken in an attempt to find the rate and extent of the hæmodilution after blood loss. Various hæmatological tests were performed on subjects at intervals after the removal of 500 millilitres of blood. The results of these tests also give information about the rate of regeneration of hæmoglobin and red cells.

Experimental Investigation.

Subjects.

Seven healthy male medical students volunteered for the investigation. All had donated blood on previous occasions without ill-effects, and none displayed reactions on the present occasion. Their ages ranged from nineteen to twenty-three years.

Collection of Blood.

The usual method was adopted for the collection of 500 millilitres of blood. Each small sample (for analysis) was collected by venepuncture with a gauge 26 needle attached to a glass syringe of five millilitres capacity. No tourniquet was used. After the syringe had been filled to the four millilitre mark, the needle was withdrawn and the blood was transferred to a paraffin-lined test tube, four inches by half an inch in size. The tube was repeatedly inverted so that the blood would be mixed with the oxalate crystals previously deposited by the evaporation, at 37° C., of 0.4 millilitre of a solution containing 1.2 grammes of ammonium oxalate and 0.8 gramme potassium oxalate per 100 millilitres. All samples were obtained with the same time relationship to meals and exertion.

Methods.

The following examinations were made on every sample of blood: erythrocyte count, hæmoglobin estimation, hæmatocrit reading, leucocyte count, reticulocyte count, estimation of the erythrocyte sedimentation rate, and estimation of erythrocyte fragility in hypotonic solutions.

Erythrocyte and leucocyte counts were performed by both the writers and the mean values were recorded. Four hæmoglobin estimations were made on every sample by independent workers. A standardized Sahli acid hæmatin instrument was employed, and the blood was permitted to remain in hydrochloric acid (1%) at room temperature for two hours before final dilution.

Erythrocyte sedimentation rates were estimated in Wintrobe's hæmatocrit tubes held vertically in a specially

constructed rack. The tubes were filled within thirty minutes of collection of the blood, and the sedimentation rates were recorded every thirty minutes for two hours. The tubes were then centrifuged at 3,500 revolutions per minute for forty minutes.

Fragility of erythrocytes in hypotonic solutions was determined by the addition of two drops of blood to each of a series of tubes containing varying strengths of sodium chloride solution. The solutions ranged from 0.50% to 0.28%, differing by 0.02% at the extremes and by 0.01% from 0.46% to 0.30%. After two hours at room temperature three readings were recorded, as follows: (i) the first tube in which the supernatant fluid was faintly pink; (ii) the first tube in which the supernatant fluid was reddish-pink; (iii) the last tube in which an erythrocyte sediment could be detected.

Reticulocytes were stained by mixing in a small agglutination tube three drops of blood, three drops of 2.6% sodium citrate solution and three drops of a 2% solution of brilliant cresyl blue in normal saline solution. The mixture was incubated at 37° C. for thirty minutes. A thin film made from the mixture was counter-stained with Leishman's stain.

Results.

Erythrocyte counts and hæmoglobin and hæmatocrit values obtained before the taking of blood and on various days afterwards are shown in Table I. The standard and absolute indices for each estimation were calculated; but as they disclose no useful information they have not been included in the table. It is of interest, however, to note that there was no significant alteration in the mean corpuscular hæmoglobin concentration.

In the opinion of the writers, hæmoglobin determinations and erythrocyte counts as performed have an experimental error of not less than $\pm 7\%$, whilst the hæmatocrit determination is accurate to within $\pm 0.5\%$. However, in spite of the inherent inaccuracies, the changes in the number of erythrocytes and in the hæmoglobin values were roughly parallel to the changes in the hæmatocrit values.

It will be seen from Table I that the lowest mean value from all three tests was recorded on the fourth day. The hæmatocrit reading, the most accurate of the three tests, was lowest on the same day in the case of each of the six subjects. Recovery was still incomplete in most instances on the twenty-fourth day after blood had been taken. Unfortunately the investigation could not be continued until complete recovery had occurred because of the commencement of the medical students' degree examinations.

Table II shows the results of tests at two, four, six and eight hours after the donation of a further 500 millilitres of blood by five of the previous subjects and by one additional subject (the seventh). These results were obtained three months after those quoted in Table I. It can be seen that the fall in hæmatocrit values commenced almost immediately after the blood was removed.

No appreciable reticulocyte response was observed in any case, nor was the fragility of the erythrocytes at any time significantly affected. The sedimentation rates were all within normal limits, but in every case a slight increase was observed between the fourth and tenth days after blood had been taken. The numbers of leucocytes were all within the normal range, and the variation was not greater than that known to occur from day to day in healthy individuals.

Discussion.

A gradual decrease in the hæmatocrit readings, hæmoglobin values and in numbers of erythrocytes of all subjects occurred for at least four days after the actual loss of blood. A similar gradual decline was observed by Ebert, Stead and Gibson. These workers removed amounts of blood varying from 760 millilitres to 1,220 millilitres from volunteers, and concluded from plasma and blood volume estimations and from plasma protein determinations that fluids were added to the circulation for four or five days. The practical significance of the finding is that the degree of an acute hæmorrhage cannot be accurately

TABLE I.

Number of Subject.	Nature of Observation.	Before Collection of Blood.	Collected Blood.	After Collection of Blood.							
				Twenty-four Hours.	Two Days.	Four Days.	Seven Days.	Ten Days.	Seventeen Days.	Twenty-four Days.	Thirty-one Days.
I ..	Erythrocytes (millions per cubic millimetre)	6.12	5.66	5.71	5.65	5.31	5.70	5.38	5.46	5.45	5.62
	Hæmoglobin value (grammes per centum)	15.7	15.5	15.3	14.7	14.1	15.3	15.7	15.1	15.2	15.6
	Hæmatocrit reading ..	46.0	44.8	43.5	42.0	40.2	43.8	42.0	42.5	43.5	44.5
II ..	Erythrocytes (millions per cubic millimetre)	5.93	5.90	5.27	5.41	5.02	5.40	6.18	5.52	5.60	
	Hæmoglobin value (grammes per centum)	14.8	14.8	14.9	14.6	14.0	14.7	14.7	15.4	15.1	
	Hæmatocrit reading ..	47.6	47.2	45.8	45.7	44.5	45.5	45.5	46.6	46.8	
III ..	Erythrocytes (millions per cubic millimetre)	5.38	6.05	5.70	5.53	5.54	5.58	5.35	5.65	5.37	5.7
	Hæmoglobin value (grammes per centum)	15.3	15.5	14.8	14.7	14.6	14.6	14.5	14.7	14.9	15.4
	Hæmatocrit reading ..	47.0	47.0	43.5	43.0	42.0	42.5	42.5	43.5	44.7	45.2
IV ..	Erythrocytes (millions per cubic millimetre)	5.47	4.56	4.64	4.69	4.68	4.87	4.81	5.41	5.25	
	Hæmoglobin value (grammes per centum)	14.5	14.2	13.6	13.5	13.3	14.3	14.0	14.5	14.0	
	Hæmatocrit reading ..	45.0	43.0	40.5	40.3	40.0	42.0	42.0	42.5	42.5	
V ..	Erythrocytes (millions per cubic millimetre)	6.37	5.82	5.69	5.65	5.50	5.70	5.36	6.16	6.20	
	Hæmoglobin value (grammes per centum)	16.8	16.0	16.1	16.2	16.1	15.4	16.2	17.2	16.9	
	Hæmatocrit reading ..	50.1	48.5	45.0	45.2	44.3	45.0	46.0	48.3	48.7	
VI ..	Erythrocytes (millions per cubic millimetre)	5.89	5.40	5.40	5.73	5.23	5.27	5.59	6.09	5.50	
	Hæmoglobin value (grammes per centum)	16.4	15.2	15.4	15.8	15.5	15.6	15.8	16.1	16.1	
	Hæmatocrit reading ..	49.0	45.8	45.0	47.5	45.0	46.3	46.0	47.0	48.0	
Average ..	Erythrocytes (millions per cubic millimetre)	5.86	5.51	5.40	5.44	5.21	5.42	5.45	5.72	5.56	
	Hæmoglobin value (grammes per centum)	15.6	15.2	15.0	14.9	14.6	15.0	15.2	15.6	15.4	
	Hæmatocrit reading ..	47.5	46.1	43.9	43.9	42.7	44.2	44.0	45.7	45.7	

TABLE II.

Number of Subject.	Nature of Observation.	Before Collection of Blood.	After Collection of Blood.			
			Two Hours.	Four Hours.	Six Hours.	Eight Hours.
II ..	Hæmoglobin value (grammes per centum)	15.0	14.7	14.4	14.2	14.0
	Hæmatocrit reading ..	49.0	47.0	47.2	43.0	46.0
III ..	Hæmoglobin value (grammes per centum)	15.0	14.5	14.2	14.2	13.9
	Hæmatocrit reading ..	45.2	44.0	44.0	40.8	41.0
IV ..	Hæmoglobin value (grammes per centum)	15.1	14.5	14.1	41.1	14.0
	Hæmatocrit reading ..	45.3	44.0	43.0	42.0	41.0
V ..	Hæmoglobin value (grammes per centum)	17.7	17.0	16.5	16.3	16.0
	Hæmatocrit reading ..	51.2	49.8	50.2	48.0	48.0
VI ..	Hæmoglobin value (grammes per centum)	16.0	15.7	15.7	15.0	14.9
	Hæmatocrit reading ..	50.0	47.7	48.2	44.0	47.5
VII ..	Hæmoglobin value (grammes per centum)	17.1	16.3	16.3	16.2	15.7
	Hæmatocrit reading ..	51.6	50.1	48.2	48.5	47.5
Average ..	Hæmoglobin value (grammes per centum)	16.0	15.5	15.2	15.0	14.8
	Hæmatocrit reading ..	48.7	47.1	46.8	44.0	45.2

assessed by hæmatological investigations until some days have elapsed, and that the need for blood transfusion or hæmatin therapy to overcome the resultant anæmia may be most apparent some days after the hæmorrhage. Patients who have had hæmorrhage from peptic ulcers often exhibit a falling hæmoglobin value for some days after the actual hæmorrhage. This fall may be a manifestation of the phenomenon described in this investigation, and is not necessarily indicative, as is usually thought, of continued hæmorrhage. The failure of blood transfusions to increase the hæmoglobin value after hæmorrhage may also be due in part to the simultaneous addition of body fluids to the circulation. An unchanged or even falling hæmoglobin value after transfusions is not

infrequently observed and is usually considered evidence of continued hæmorrhage or erythrocyte destruction.

Restoration of the hæmoglobin value, even after a comparatively small blood loss, is a prolonged process. It was not complete after twenty-four days in most of the subjects investigated. However, no evidence was obtained that additional iron was necessary.

Summary.

The changes in some hæmatological values following the removal of 500 millilitres of blood were investigated in six healthy male subjects. The maximum reduction of hæmoglobin and hæmatocrit values and of numbers of erythro-

cytes does not occur for about four days. The significance of this finding in the treatment of intestinal hæmorrhage is discussed. Restoration of the lost erythrocytes and hæmoglobin takes place shortly.

Acknowledgements.

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Bibliography.

R. V. Ebert, E. A. Stead and J. G. Gibson: "Response of Normal Subject to Acute Blood Loss", *Archives of Internal Medicine*, Volume LXVIII, September, 1941, page 578.

EARLY RESULTS OF THE TREATMENT OF GUNSHOT WOUNDS OF LIMB JOINTS AIDED BY PENICILLIN THERAPY.

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THE early results obtained in the treatment of sixty-six gunshot wounds of limb joints are presented. These casualties were initially treated in forward areas, and their progress was followed for at least five weeks, when the condition of the joints was able to be reviewed.

The wounds were caused by the various weapons of modern war and could roughly be divided into the following three types: (i) type A: the capsule and synovial membrane only were involved, the damage varying from small perforations to large rents; (ii) type B: in addition to capsular injury the bone ends were damaged; varying areas of the articular surfaces were involved, but there was a minimum of cartilage loss and displacement of fragments; (iii) type C: the joints were completely disorganized, with shattered articular surfaces and much loss of cartilage and displacement of fragments. In both types B and C varying degrees of involvement of the shafts of the bones forming the joint were present. Surrounding soft-tissue damage varied from minor perforations to gross destruction, neighbouring nerves and vessels being implicated in some instances. Many wounds were contaminated by dirt and clothing, and some were already infected.¹ The missiles, often numerous, either traversed the limb or were retained in the soft tissues, bones or joint cavities.

In this series 14 cases belonged to type A, 12 to type B and 40 to type C.

TREATMENT.

The first essential of treatment in these, as in all limb injuries, is to save life; the second is to save the limb, provided an adequate blood supply is present; and the third is to secure a well-functioning limb. These are ensured by modern resuscitation therapy and by the prevention or lessening of infection by adequate surgery aided by penicillin, both parenterally and into the joint, and the local use of "Monacrin" where indicated. Consequently, nowadays the ultimate state of the joint depends on the initial damage, mobile joints being expected in wounds of types A and B, and ankylosis in wounds of type C, whether infection supervenes or not.

Field dressings and emergency splints were applied as first-aid measures. Sulphamerazine was administered

¹ The term "infection" as used in this paper implies "clinical inflammation".

orally until penicillin therapy could be commenced, when 15,000 units were injected intramuscularly every three hours. Gas-gangrene antiserum and tetanus toxoid were given as a routine measure in all cases.

Patients with severe injuries required resuscitation whether they appeared to need it or not. Stored or fresh blood was used in all instances, as this "shock-like" condition is due to loss of blood, either externally or internally, into the tissues,⁽⁴⁾ and serum is not sufficient to enable such patients to undergo operation. Blood was given rapidly at first (one litre in ten minutes or even two litres in thirty minutes may be required) and then more slowly until the patient was judged fit for operation. When this was likely to be prolonged or if a major amputation was required, transfusion was continued throughout the operation and thereafter for as long as necessary. In severe cases many litres of blood were required in the first few days.

All patients were radiologically examined prior to operation when facilities were available, and the state of the joint and position of metallic foreign bodies were noted. "Pentothal" was used for anaesthesia in all instances. The extent of operation varied according to the type of wound present (amputation is discussed later). Traversing joint wounds with minimum tissue damage, due to high-velocity missiles, required only the aspiration of blood and the instillation into the joint cavity of 100,000 units of penicillin solution (5,000 units per millilitre). Surgical treatment was necessary in all other cases. Routine soft-tissue excision was performed and the joint was inspected, a fresh incision being used if the wound did not allow adequate exposure. Blood was evacuated and foreign material and loose fragments of bone and cartilage were removed from the joint cavity. If the articular surfaces were badly smashed up, they were smoothed and all cartilage was removed, as it was obvious that ankylosis would occur. In the knee joint the patella was conserved unless its articular surface was badly damaged. Loose marginal fragments and crack fractures of the articular surface are not sufficient indications for excision of the patella. It has been shown, moreover, that routine patellectomy in such cases does not yield as good an ultimate result as one could wish.⁽⁵⁾

The synovial membrane and capsule were sutured whenever possible, as this measure prevents secondary infection from gaining access to the joint from the exterior.⁽⁷⁾ This was done even when foreign bodies suspected of being in the joint cavity could not be found. (This is apt to occur in small penetrating wounds in the absence of X-ray facilities.) Obviously, capsular suture could not be performed in the small joints of the hands and feet.

Before the last capsular stitch was tied, 100,000 units of penicillin were instilled into the joint. The soft tissues were then insufflated with penicillin-sulphanilamide powder. In recent wounds, where bone or cartilage involvement was minimal, primary suture of the skin was performed if damage to the soft tissues was not severe and there was no contamination by foreign organic matter. If these conditions could not be fulfilled, or if the patient could not be observed for a week, then the wound was covered with "Vaseline" gauze.

Sometimes the capsule and soft tissues were so damaged and friable that the joint could not be closed. The whole wound was then filled down to, but not into, the joint cavity with gauze soaked in 1 in 1,000 "Monacrin" solution, in order to keep out secondary bacterial invaders. This gauze was changed every third day until the joint was able to be closed.

If the wound had not been radiologically examined at the time of the initial treatment, this was done as soon as facilities were available. Intraarticular foreign bodies missed at the primary wound excision were localized and removed as soon as possible, the approach depending on their position in the joint. The capsule was again sutured and 100,000 units of penicillin were left in the joint. Skin suture was again performed if the indications were present. Otherwise, in those cases in which the skin had not been sutured, wound revision was performed about the fifth

day, and thereafter until suture of the skin could be performed—that is, when no infection or oedema was present. Skin loss at times required split skin grafts or more complicated plastic procedures.

In the case of many shattered joints, complete excision of all damaged tissue was impossible; this meant that infection by penicillin-sensitive *Staphylococcus aureus* and Gram-negative penicillin-resistant bacilli was bound to occur in spite of penicillin therapy. In some cases, when the casualties were late reaching the surgeon, infection was already well established. Infection may commence in the joint, in the bone or in the soft tissues, and it may remain localized or spread from one tissue to another. In badly shattered limbs spread may occur along fascial planes, forming ever-extending and recurring abscesses.

All such infected wounds were treated according to the tissue involved. In the soft tissues, wound revision was performed and foreign bodies were removed. Skin sutures were released if they were already present. Abscesses were widely opened and limiting fasciae were split. Infected necrotic bone was removed and adequate drainage was ensured by wide incisions. In the case of infection in the joint cavity, if the effusion was not frankly purulent, it was aspirated and 100,000 units of penicillin were instilled every twelve hours. Arthrotomy was performed if foreign bodies were present and if the effusion became purulent. In such cases the foreign bodies were removed, and if the cartilage was healthy the joint was closed and treated with repeated aspiration and instillation of penicillin. If, however, the cartilage and bone ends were necrotic, they were excised and "Monacrin" drip treatment was instituted as described below, the capsule being left open. A complete formal excision or resection of the joint as advocated by some authorities^(11,12) was never performed at this early stage for fear of spreading sepsis. If, in spite of all treatment, infection continued to spread, then amputation had to be considered (*vide infra*).

"Monacrin."

A 1 in 1,000 solution of "Monacrin" was applied locally in all the infected wounds, as this antiseptic is efficacious not only against the pyococci, but also against *Bacillus coli communis* and to a lesser extent against *Bacillus proteus*. It has no effect on *Pseudomonas pyocyaneus*, but when this is present "Monacrin" is combined with acetic acid (2% strength). To shallow soft-tissue wounds it was applied on gauze twice a day, and in the case of deep wounds, including open joints, it was dripped through tubes attached to a "Solvac" flask at the rate of eight drops per minute until infection had subsided.

Penicillin.

Penicillin was given parenterally in all cases, 15,000 units being injected intramuscularly every three hours. All battle wounds contain pathogenic penicillin-sensitive bacteria (pyococci and anaerobes) as soon as they are incurred, and these may be found in tissues far removed from the wound track. Penicillin will prevent them from causing infection unless necrotic material is present; but here it can keep the infection localized and prevent blood-stream invasion. Should gross tissue destruction and contamination be present, penicillin may not be able to prevent spread of infection, but it slows it down, and the patient's general condition is kept up. Penicillin therapy was continued until it was certain that infection was not going to occur in clean wounds, or that it was cured in infected wounds. In those cases in which skin suture was performed late, after initial penicillin therapy had ceased, it was recommenced twenty-four hours before suture was undertaken and continued as before.

Although it is now known that penicillin will enter serous cavities from intramuscular injection,⁽¹³⁾ the present accepted method is to inject it locally into the joint, where it may be found thirteen to twenty-two hours later.⁽¹³⁾ In the case of "clean" wounds, 100,000 units were injected at operation and thereafter 50,000 units every twenty-four hours when the joint was aspirated. This administration was stopped as soon as the joint became dry. In the case of infected wounds, 100,000 units were injected every

twelve hours until the infection subsided or arthrotomy had to be performed to remove necrotic cartilage. "Monacrin" drip therapy was then instituted.

Thus the penicillin treatment of gunshot wounds of joints is by the parenteral injection of penicillin for the periarticular tissues and the local use of penicillin for the joint itself.⁽¹³⁾

Penicillin tubes were not used in this series for fear of secondary infection by penicillin-resistant organisms.

Immobilization.

In many instances immobilization of the joint was ensured by the treatment of the associated fracture, routine methods being employed. When plaster casts were used windows were cut over the wounds so that the joints could be aspirated and the wounds watched. In the case of uninfected knee joints with soft-tissue injury only, immobilization was ensured by pressure bandages from ankle to groin, reinforced with a back splint. In the case of infected joints with healthy articular surfaces the surfaces were kept apart by light traction with strapping extension.

Mobilization.

No set date can be given as to the time when movement of these joints may be commenced. Even the smallest perforation by these missiles is surrounded by an area of bruising and concussion. A painful, tender joint needs rest,⁽¹⁴⁾ so that loss of pain and tenderness is an indication that cautious active movement may be commenced. The presence of effusion is not a contraindication to movement, provided it is not aggravated by it.

In the case of less serious wounds of the knees, quadriceps exercises were commenced soon after receipt of the wound. Active movements were able to be initiated about a week later, and weight-bearing exercises a week later still. Full normal movements were present about a month after receipt of the wound. Large capsular tears, excision of the patella or infection prolonged all stages in the recovery of mobility.

Joints in which bone and cartilage are involved, but in which movement is expected, must be immobilized until the bones have united.

General Treatment.

The patient's general welfare is most important. Anaemia was rectified by transfusions of blood, and concurrent conditions, such as hookworm infestation and skin infections, were treated.

RESULTS.

The periods of time and amounts of penicillin recorded represent an average figure for each particular group.

These results are discussed in two sections. The first section deals with type A wounds of joints with soft-tissue involvement only; the second section includes types B and C wounds of joints with bone and cartilage involvement in addition.

Section I.

There were 14 joints in the first section—12 knee and two ankle joints. Of these, one knee joint was infected prior to the initial surgical treatment.

Of the 13 remaining joints, one knee required no local treatment other than repeated aspirations of blood and injections of penicillin into the joint. The others were excised nine hours after receipt of the wound, three knee joints requiring further arthrotomy for removal of metallic foreign bodies ten hours later. All capsules were sutured at the initial operation, and again if later arthrotomy was performed. Primary skin suture was performed in all cases except that of one ankle joint, which had lost so much skin that it had to be replaced by plastic means five weeks later. These patients received 700,000 units of penicillin intramuscularly and 150,000 units by intra-articular administration. None of the joint cavities became infected, but superficial wound sepsis occurred in three; one infection was caused by *Bacillus proteus*, and

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joint cavities had a mixed infection by a penicillin-sensitive *Staphylococcus aureus* and *Bacillus proteus*. These wounds rapidly healed after removal of the sutures and the institution of "Monacrin" treatment. All thirteen joints commenced moving within fourteen days, and the patients were able to walk well in a month.

The infected knee joint already mentioned was not examined until four days after receipt of the wound. It was full of blood-stained, turbid fluid, from which a penicillin-sensitive *Staphylococcus aureus* was grown on culture. Excision was performed and a foreign body was removed from the joint whose cartilage was normal. The capsule was closed immediately and skin suture was performed five days later. The infection was overcome after repeated aspirations and after a total of 500,000 units of penicillin had been injected into the joint cavity and 600,000 units had been given parenterally. Good movement was returning three weeks later, and weight-bearing was commenced five weeks after receipt of the wound.

Tetanus.

One patient developed clinical tetanus during treatment.

A Japanese prisoner-of-war was examined twenty-four hours after he had sustained a penetrating capsular wound of the knee joint. He was given routine tetanus toxoid, gas-gangrene antiserum and parenteral penicillin therapy. The wound was excised, penicillin was left in the joint, and suture of the capsule and skin was performed. Five days later, when X-ray facilities were available, a further arthrotomy was performed and a bullet was removed from the joint cavity. The joint was clean and the effusion was sterile. Capsule and skin were again sutured. A day later (seven days after receipt of the wound), when he had received 570,000 units of penicillin parenterally and 300,000 units by intraarticular injection, his temperature rose and prolonged muscle spasms characterized by *risus sardonicus*, clenched jaws and opisthotonos, occurred with great pain. Consciousness was not lost, and the slightest stimulus would provoke a spasm. Narcosis was obtained for twenty-four hours with "Pentothal" given intramuscularly; 580,000 units of tetanus antiserum (100,000 units given intravenously at once and 20,000 units given intramuscularly every two hours for forty-eight hours), and a further 240,000 units of penicillin given parenterally, were administered. Spasms ceased in twenty-four hours and did not recur. The joint itself recovered well and the patient was walking three weeks later.

Though no organism was ever isolated, the condition was typical clinical tetanus. Tetanus antiserum should have been given originally instead of toxoid, as there was no reason to believe that the patient had been recently immunized. The role of penicillin in the treatment of tetanus is difficult to assess, as so few cases occur.⁽¹⁾ This illness occurred during penicillin therapy, and it was cured by a relatively small dose of tetanus antiserum and further penicillin.

Section II.

There were 52 joints in the second section, and they are briefly summarized in Table I. Six wounds were of the type requiring no surgical intervention. Penicillin treatment was commenced within eight hours of receipt of the wound, and the casualties received 420,000 units of penicillin parenterally and 150,000 units into the joint. No joints became infected.

The skin wounds were closed by primary suture in seven cases, with two failures. These casualties were treated eight hours after receipt of the wound, and in the successful cases 660,000 units of penicillin were given parenterally and 100,000 units into the joint. Two failures occurred. In one case patellectomy was followed by joint infection by direct spread from a coincidental furunculosis in the wound (Case XI, Table III), and in the other a skin infection only followed (Case XII, Table III). Both patients finally had normal joint function.

There were four successful cases of delayed primary skin suture, three tarsal wounds and one ankle joint wound. The wounds were excised ten hours after receipt; the capsule of the wounded ankle was sutured, whereas the tarsal wounds were packed with "Monacrin" gauze. Skin suture was performed on the fifth day. In each case 700,000 units of penicillin were given parenterally and the ankle wound received 200,000 units of penicillin in the joint cavity.

Secondary skin suture was performed in three cases—one elbow wound, one tarsal wound and one carpal wound. All were excised within twelve hours of receipt; the capsule was sutured in the case of the elbow, and the other wounds were packed with "Monacrin" gauze. All these patients received 980,000 units of penicillin parenterally and the patient with the wounded elbow received 100,000 units in the joint. Skin suture was performed on the fourteenth day. The carpal suture failed, owing to soft-tissue infection; this healed rapidly after removal of the sutures and application of "Monacrin" (Case IX, Table III).

In the 20 cases already considered there were twelve in which large joints were involved (seven knees, two elbows, two wrists and one ankle), and in all except one good movement resulted; the one failure was the case of an elbow, which was so badly shattered that ankylosis occurred. In the case of the eight tarsal and carpal joints ankylosis necessarily occurred.

In ten cases suture was impossible in the first four weeks after receipt of the wound, because of infection. Two wounds (a hip, Case III, and a knee, Case XIII, Table III) belonged to type B, and infection occurred in bone and soft tissues only, mobile joints resulting. The other eight wounds belonged to type C wounds, and in all the final result was ankylosis. Seven patients (Cases I,

TABLE I.
Summary of Results of Treatment of Fifty-two Joints with Bone and Cartilage Involvement.

Joint, and Number of Instances.	Aspiration Only.	Suture of Skin.					Amputations.	
		Primary Suture.		Delayed Primary Suture, Successful.	Secondary Suture.		Not Sutured in One Month.	
		Success.	Failure.		Success.	Failure.		Immediate. Delayed.
Shoulder, 1	—	—	—	—	—	—	1	— —
Elbow, 3	—	1	—	—	1	—	1	— —
Wrist with proximal carpal, 3	2	—	—	—	—	—	1	— —
Distal carpal and carpo-	2	—	—	—	—	1	1	1 —
metacarpal, 5	—	—	—	—	—	—	—	— —
Metacarpophalangeal and	—	—	—	—	—	—	—	— —
interphalangeal, 8	—	—	—	—	—	—	—	8 —
Hip, 1	—	—	—	—	—	—	1	— —
Knee, 7	1	1	1	—	—	—	1	1 2
Knee (patella only), 4 ..	—	3	1	—	—	—	—	— —
Ankle, 4	—	—	—	1	—	—	3	2 —
Tarsal and tarso-metatarsal, 10	1	—	—	3	1	—	1	— 2
Metatarsophalangeal and	—	—	—	—	—	—	—	— —
interphalangeal, 6	—	—	—	—	—	—	—	6 —
Total	6	5	2	4	2	1	10	18 4

TABLE II.
Cases in which Amputations were Required; All Wounds Belonged to Type C.

Case Number.	Joint.	Time After Receipt of Wound.		Reason.	Type of Amputation and Treatment of Stump.	Total Penicillin Used (in 100,000 Units).	
		Excision.	Amputation.			Before Amputation.	After Amputation.
Immediate Amputations.							
I	Knee (femur).	—	48 hours.	Division of popliteal vessels and death of limb. Penicillin-sensitive hemolytic streptococcal infection of wound.	Mid-thigh with open flaps. Proteus abscess developed in stump. Flaps sutured 14 days later; failure due to proteus infection. Successful suture 10 days later.	—	10.2
II and III.	Ankle and tarsus.	—	8 hours.	Shattering of limb with division of tibial vessels.	Below-knee with open flaps, which were successfully sutured five days later.	—	4.8
IV to XVIII (inclusive).	Metatarso-phalangeal, metacarpophalangeal and interphalangeal.	—	8 hours.	Shattering of digits.	Digital, at times with partial hand and foot amputations. Primary suture flaps, all healing successfully, except three, which failed owing to soft-tissue infection from penicillin-sensitive <i>Staphylococcus aureus</i> and <i>Bacillus proteus</i> . Secondary suture performed successfully.	—	4.8
Delayed Amputations.							
XIX.	Knee (all bones).	8 hours.	22 days.	Recurrent proteus abscesses spreading up thigh.	High-thigh, with open flaps, which were successfully sutured four days later.	12.0	8.2
XX.	Knee (tibia).	6 hours.	6 days.	Delayed thrombosis of popliteal artery causing death of limb, followed by gas gangrene.	Mid-thigh with open flaps, successfully sutured six days later; 40,000 units of gas-gangrene antiserum before and 78,000 units of gas-gangrene antiserum after amputation.	7.2 by intra-muscular injection and 6.0 into joint.	8.4
XXI.	Tarsus.	17 hours.	12 days.	Spreading penicillin-sensitive <i>Staphylococcus aureus</i> and <i>Bacillus proteus</i> infection.	Below-knee, with open flaps, successfully sutured 14 days later.	4.8	7.2
XXII.	Forefoot.	8 hours.	5 days.	Necrosis of forefoot and proteus infection.	Chopart, no flap. Ready for re-amputation two weeks later.	4.8	4.8

II, V, VI, VII, VIII and XV, Table III) had infection in all tissues, and one (Case XVII, Table III) in bone and joint only. In four cases (II, III, VI and VIII) the wounds had ceased discharging and presented a healthy granulating surface at the end of five weeks, whereas in the other six (Cases I, V, VII, XIII, XV and XVII) a discharging sinus was still present, though the discharge was lessening.

Amputations.

The details of the amputations are fully summarized in Table II. There were eighteen immediate amputations—three major amputations for shattered limbs with arterial damage (Cases I, II and III, Table II), and fifteen finger and toe amputations for shattered digits.

There were four delayed amputations, two because of spreading infection (Cases XIX and XXI, Table II), one for necrosis of the forefoot due to land-mine blast (Case XXII, Table II) and one for gas gangrene arising in a dead limb consequent upon slow thrombosis of the popliteal artery (Case XX, Table II). Certain comments may be made on these cases.

Gunshot wounds of the tarsus present many problems. Donald⁽⁷⁾ states that in all but the mildest cases compound tarsal injuries require amputation sooner or later, and he thinks the sooner it is performed, the better. McMurray⁽¹¹⁾ advises the exercise of caution in doubtful cases, as even a bad live limb is sometimes better than an artificial leg, and penicillin appears to have been of benefit in through-and-through wounds of the tarsus.⁽¹²⁾ In the series presented here, there were ten gunshot wounds of the tarsus and tarso-metatarsus. Two required amputation within the first twelve days, and three of the remaining eight became infected. At the end of five weeks all had healed except three, and all joints were ankylosing well. Nevertheless,

ultimate function will be in doubt until the effect of weight-bearing is seen. The calcaneus was involved in three of these cases, and Ross⁽¹³⁾ states that in 100% of compound fractures of the calcaneus in the South African force amputation was necessary.

There were two thigh amputations due to popliteal artery involvement. In the first case (Case I, Table II) the leg, when examined forty-eight hours after receipt of the wound, was dead from just below the knee. Examination of the specimen showed that a machine-gun bullet had shattered the knee joint and lodged in the popliteal fossa, accompanied by many bone fragments. These had severely damaged the muscles bounding the fossa and lacerated the popliteal artery and vein from the adductor hiatus down to the soleus muscle. The vessels were surrounded by a large hematoma, and both were completely thrombosed in their whole length. This thrombosis involved all geniculate arteries and had spread into the tibial vessels.

In the second case (Case XX, Table II) mortar bomb fragments caused complete disintegration of the knee joint. Bone fragments were blown back into the popliteal fossa, one tearing the popliteal vein and causing a large hematoma, which spread down the calf with the posterior tibial vessels. Operation six hours later, when the vein was ligated, disclosed that the artery was bruised along the whole of its length, but it was still pulsating strongly, though it seemed a little constricted. Muscle damage was severe, and the medial popliteal nerve had been severed. The leg was cooler than the normal leg, but still warm, and the foot was able to be moved voluntarily. The artery was not touched, in the hope that if thrombosis occurred it might be delayed sufficiently to allow the anastomotic vessels to dilate and so conserve the limb.⁽¹⁴⁾ Attempts to help this were made by giving rapid blood transfusions,⁽¹⁵⁾ by injecting the lumbar sympathetic trunk with "Novocain" (this

TABLE III.
Infection in Wounds with Bone and Cartilage Involvement.

Case Number.	Joint Wounded, and Type of Wound.	Time Before Excision.	Organisms.	Site of Infection.	Progress.	Amount of Penicillin (In 100,000 Units).	
						Before Infection Appeared.	After Infection Appeared.
Cases in which Infection was Obviously Present Before Operation.							
I	Shoulder, type C.	4 days.	<i>Staphylococcus aureus</i> and <i>Bacillus proteus</i> .	All tissues, multiple peri-articular abscesses.	Excision and multiple incisions. Drainage ceased in six weeks, joint ankylosing well.	—	18·0
II	Carpus, type C.	24 hours.	<i>Staphylococcus aureus</i> and <i>Bacillus proteus</i> .	All tissues.	Wound drained, healing in five weeks, joint ankylosing.	—	6·0
III	Hip, type B.	3 days.	<i>Staphylococcus aureus</i> and <i>Bacillus proteus</i> and <i>Pseudomonas pyocyaneus</i> .	Bone and soft tissues.	Soft tissues healing well one month later. Joint moving. No discharge from wound.	—	24·0
IV	Case I, Table II.						
V	Ankle, type C.	7 days.	<i>Staphylococcus aureus</i> and <i>Bacillus proteus</i> .	All tissues, abscesses travelling up calf.	Talus removed and wide drainage. Healed in three months, joint ankylosing.	—	35·0
VI	Tarsus, type C.	2 days.	<i>Staphylococcus aureus</i> and <i>Bacillus proteus</i> .	All tissues.	Healing well, five weeks later. No discharge from wound, joints ankylosing.	—	10·2
Cases in which Infection Revealed Itself After Operation.							
VII	Elbow, type C.	12 hours.	<i>Staphylococcus aureus</i> and <i>Bacillus proteus</i> .	All tissues.	Infection appeared two days later. Discharge lessening four weeks later and joint ankylosing.	2·4	9·0
VIII	Wrist, type C.	10 hours.	<i>Bacillus proteus</i> .	All tissues.	Infection appeared three days later. Discharge lessening five weeks later, joint ankylosing.	2·6	9·6
IX	Carpo - metacarpal, type C.	8 hours.	<i>Staphylococcus aureus</i> and <i>Bacillus proteus</i> .	Soft tissues.	Infection appeared five days later. Secondary suture ten days later, failed owing to infection; healing by granulation tissue fourteen days later. Joint ankylosing.	2·4	7·2
X	Case XIX, Table II.						
XI	Knee; patella excised, femur, tibia normal.	12 hours.	<i>Staphylococcus aureus</i> .	Soft tissues and joint.	Primary suture failed on tenth day owing to furuncle developing in suture line, infection spreading into joint. Wound healed three weeks later. Normal joint movement three months later.	4·5 by intra-muscular injection, 1·5 into joint.	9·45 by intra-muscular injection, 4·5 into joint.
XII	Knee; patella excised, femur, tibia normal.	12 hours.	<i>Bacillus proteus</i> .	Soft tissues.	Primary suture. Skin infection on fifth day, which healed by granulation tissue. Joint unaffected and moving well one month later.	6·0 by intra-muscular injection, 2·0 into joint.	12·0 by intra-muscular injection, 2·0 into joint.
XIII	Knee (tibia), type B.	17 hours.	<i>Bacillus proteus</i> and <i>Pseudomonas pyocyaneus</i> .	Bone.	Foreign body removed from joint three days later. Tibial infection appeared five days later. Joint not infected. Wound healed five weeks later, joint commencing to move.	6·0 by intra-muscular injection, 2·0 into joint.	6·0 by intra-muscular injection, 2·0 into joint.
XIV	Case XX, Table II.						
XV	Tarsus, type C.	12 hours.	<i>Staphylococcus aureus</i> and <i>Bacillus proteus</i> .	All tissues.	Foreign body removed three days later, large abscess developed in sole of foot and tarsus; still discharging five weeks later, joints ankylosing.	3·6	4·8
XVI	Case XXI, Table II.						
XVII	Tarsus and metatarsus, type C.	8 hours.	<i>Staphylococcus aureus</i> and <i>Bacillus proteus</i> .	All tissues.	Infection appeared three days later. Wound still discharging five weeks later, joints ankylosing.	3·6	2·4
XVIII	Case XXII, Table II.						

was helped by the already divided sympathetic fibres in the medial popliteal nerve) and by keeping the limb cool with fans. On the sixth day, however, it was certain that the limb was going to die. The calf then suddenly commenced to swell and the patient's condition deteriorated. Immediate mid-thigh amputation was performed through tissues that appeared normal. Examination of the specimen revealed that the whole leg below the knee was necrotic. The calf

muscles were the seat of gas gangrene, and gas was present in the medullary cavity of the tibia. Gram-positive bacilli were found in a smear (facilities for anaerobic culture were not available). The popliteal artery was completely thrombosed in the whole of its length, as well as the vein, and this involved the geniculate and tibial vessels as well. The intima of the artery was ruptured and the media and intima were bruised.

TABLE IV.
State of All Joints Five Weeks after Receipt of Wound.

Type of Joint Wounds.	Number of Cases.	Joints Involved.	Condition of Joints After Treatment.	Clinical State of Bones.	State of Soft Tissues.
A	14	12 knees.	Normal function in all save the infected knee, in which movement was rapidly being recovered.	—	All healed.
		2 ankles.	Normal function rapidly being recovered.	—	One healed and the other ready for plastic surgery for skin defect.
B	12	1 hip.	Movement returning, no fluid in joint.	Uniting.	Ready for plastic surgery for skin defect.
		4 knees (without patellar involvement).	Movement returning, no fluid in joint.	Uniting.	All healed.
		3 knees (patellar involvement only, requiring patellectomy).	Movements returning and weight-bearing commencing in two cases. Movements returning in one infected knee.	—	All healed.
		1 knee (patellar involvement not requiring patellectomy).	Movement and weight-bearing returning well.	Uniting.	Healed.
		1 elbow, 1 ankle, 1 wrist.	Movements returning.	Uniting.	All healed.
		8 tarsi.	Ankylosing.	All uniting, two discharging pus through sinuses.	Five healed, one open but clean and granulating.
C	18	4 carpi.	Ankylosing.	Uniting, one discharging pus.	Three healed.
		1 shoulder.	Ankylosing.	Uniting. Small sinus with slight discharge.	
		2 elbows.	Ankylosing.	One small sinus, the other healed. Uniting.	One healed.
		2 wrists and 1 ankle.	Ankylosing.	Uniting.	Healed.

In these cases of severe extensive popliteal artery damage, especially when muscles and geniculate vessels are involved, the limb never survives.⁽¹⁰⁾⁽¹¹⁾ Yeates⁽²⁰⁾ reported a survival after ligation of the popliteal artery; but little damage had occurred to muscle or geniculate vessels. This case illustrates one of the dangers associated with attempting to save such a limb—namely, the onset of gas gangrene in necrotic muscle, especially when the popliteal artery is involved.⁽¹²⁾ Gas gangrene cannot be prevented by penicillin or antiserum in the presence of necrotic tissue, and it will spread at least as far as the barrier set up by the circulating blood containing penicillin.⁽⁹⁾ In these cases, too, it is most important that the administration of penicillin be continued after amputation, as the absence of clinical infection in the stump is no guarantee that clostridia are not present. Penicillin will prevent gas gangrene from recurring there.⁽⁹⁾

Treatment of the Stump.—Major amputations were performed with skin flaps. These were turned back and the stump was covered with gauze soaked in "Monacrin" to keep out secondary infection. Penicillin was given parenterally and the flaps were sutured as soon as possible.⁽⁹⁾ This method proved successful in ensuring quick healing of the stump. One Chopart amputation through the foot was performed with no flaps. The local application of "Monacrin" and the parenteral administration of penicillin kept the wound clean, so that reamputation was able to be performed early.

Infections.

Table III summarizes those cases of Section II—that is, type B and C wounds—in which infection occurred. Of the 52 cases in this section, infection was apparent in six before operation and appeared in twelve after operation.

Three major amputations were performed because of infection alone. In the other cases the main effect of infection was to prolong the healing time of all tissues. Ankylosis of joints was due to the original damage and not to any infection, though the more extensive the damage, the greater the incidence of sepsis and the harder it is to eliminate.⁽⁹⁾ In those joints whose cartilage, though damaged, was not missing or displaced, mobility followed in spite of cavity infection. Burns, Young and Muller⁽²¹⁾ point out that suppurative arthritis in these penicillin-

treated casualties is less severe and more subdued in its effects than in other cases, as was shown in Case XI (Table III) of an infected knee joint. Osteitis may occur in the damaged bone, but it does not spread into the joint (Cases III and XIII, Table III). These authors state that the worst effects of infection are now due to *Bacillus coli communis* or to *Bacillus proteus* (Case XIX, Table II).

In no case did septicaemia develop, and local infection was controlled by penicillin, "Monacrin" and surgical measures, except in two cases (Case XIX, Table II, *Bacillus proteus* infection, and Case XXI, Table II, mixed penicillin-sensitive *Staphylococcus aureus* and *Bacillus proteus* infection), in which excessive damage was present in all tissues.

Organisms.—Aerobic cultures in the eighteen cases of infection yielded the following results. The commonest organism of initial sepsis in these wounds is *Staphylococcus aureus*,⁽⁹⁾ and in this series eleven wounds were infected by a penicillin-sensitive *Staphylococcus aureus*, in nine cases associated with *Bacillus proteus*, and in one with *Bacillus proteus* and *Pseudomonas pyocyaneus*. Five infections were due to *Bacillus proteus*, in one associated with *Pseudomonas pyocyaneus*. There were one penicillin-sensitive hemolytic streptococcal infection and one clostridial infection.

Review of All Results.

Table IV gives a brief review of the condition of the forty-four joints which had not required amputation at the end of five weeks after receipt of the wound.

Now that penicillin has minimized the effects of pyogenic cocci and anaerobes, and local "Monacrin" therapy that of the Gram-negative penicillin resisters, the ultimate result is in direct proportion to the structural damage.⁽⁹⁾ This is borne out in this series, the joints which ankylosed being those which had been shattered (type C, Table IV), whereas wounded joints of types A and B achieved good movements even when infection occurred. Naturally the ultimate results may not be so good as these early results. Some tarsal wounds may later require amputation, extensive soft-tissue scarring may interfere with mobility, and osteoarthritis may supervene in joints that have received cartilaginous injury. Ankylosis may be imperfect in many

of the shattered joints, and further operation may be required.

There were twenty-three gunshot wounds of the knee. Twelve wounds belonged to type A, and in all these cases a normal joint resulted, though in one suppurative arthritis developed. Four men with wounded knees had type B involvement of the tibial and femoral articular surfaces; these were recovering movement in five weeks and the joints were quiet, with no fluid. Four men with knee wounds had patellar involvement only, three requiring patellectomy. Suppurative arthritis occurred in one, but all were recovering full movement and were walking well eight weeks after receipt of the wound. In three cases of badly shattered knee joints amputation of the limb was required, in one because of infection and in two because of popliteal artery damage.

SUMMARY.

A review of the early treatment of sixty-six gunshot wounds of limb joints is presented. It is shown that the ultimate result depends on the structural damage sustained, because penicillin, administered both parenterally and into the joint, and the local application of "Monacrin", where indicated, have reduced the more serious effects of infection. Though these substances cannot prevent infection in shattered or contaminated joints or in contaminated wounds, nevertheless in most instances they help to localize it and prevent death from septicæmia or sepsis and loss of limb. Infection still prolongs the healing time of bone and soft tissue.

The details of treatment, the incidence of infection and the results at the end of five weeks are discussed.

One case of clinical tetanus and one of gas gangrene occurred, and these are discussed fully.

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REFERENCES.

- ⁽¹⁾ F. H. Bentley, S. Thomson, A. K. Bingham, J. A. Key and M. H. Wolstenholme: "Treatment of Compound Fractures by Early Wound Suture and Penicillin", *The Lancet*, Volume I, February 24, 1945, page 232.
- ⁽²⁾ F. H. Bentley and S. Thomson: "Control of Infection in Recent Wounds by Surgery and Local Chemotherapy", *British Medical Journal*, Volume I, 1945, page 471.
- ⁽³⁾ B. H. Burns, R. H. Young and G. M. Muller: "Wounds of the Knee Joint", *The Lancet*, Volume I, May 5, 1945, page 551.
- ⁽⁴⁾ R. Buxton and R. Kierman: "Tetanus. Report of Two Cases Treated with Penicillin", *The Journal of the American Medical Association*, Volume CXXVII, 1945, page 26.
- ⁽⁵⁾ E. D. Churchill: "The Surgical Management of the Wounds in the Mediterranean Theatre at the time of the Fall of Rome", *Annals of Surgery*, Volume CXX, September, 1944, page 268.
- ⁽⁶⁾ J. V. Cooke and D. Goldring: "Concentration of Penicillin in Various Body Fluids During Penicillin Therapy", *The Journal of the American Medical Association*, Volume CXXVII, 1945, page 80; *The Lancet*, Volume I, April 7, 1945, page 439.
- ⁽⁷⁾ C. Donald: "With the Eighth Army in the Field", *British Medical Journal*, Volume I, May 27, 1944, page 709.
- ⁽⁸⁾ H. Edwards: "Revival of Early Wound Closure. Two Stage Operation Applied in Italy", *The Lancet*, Volume I, May 12, 1945, page 583.
- ⁽⁹⁾ G. Fisher, M. E. Florey, T. Grimson and P. Williams: "Penicillin in Clostridial Infections", *The Lancet*, Volume I, March 31, 1945, page 395.
- ⁽¹⁰⁾ B. C. Maybury: "Treatment of Traumatic False Aneurysm and Arteriovenous Fistula", *Bulletin of War Medicine*, Volume V, March, 1945, page 417.
- ⁽¹¹⁾ T. P. McMurray: *British Medical Journal*, Volume I, January 13, 1945, page 56.
- ⁽¹²⁾ E. K. Molodtsov: "The Treatment of Gunshot Wounds of the Large Joints", *Khirurgiya*, Volume XIV, Number 1, 1944, page 12; abstracted in *Bulletin of War Medicine*, Volume 5, January, 1945, page 301.
- ⁽¹³⁾ "Penicillin in Serous Cavities", *The Lancet*, Volume I, April 7, 1945, page 439.
- ⁽¹⁴⁾ D. P. Phenister: "The Mechanism and Management of Surgical Shock", *The Journal of the American Medical Association*, Volume CXXVII, April 28, 1945, page 1109.
- ⁽¹⁵⁾ C. H. Rammelkamp and C. S. Keefer: "Absorption, Excretion and Toxicity of Penicillin Administered by Intrathecal Injection", *The Journal of Clinical Investigation*, Volume XXII, 1943, page 425; quoted in *The Lancet*, Volume I, April 7, 1945, page 439.
- ⁽¹⁶⁾ Lambert Rogers: "Physiological Considerations in Vascular Surgery and Ligation of the Main Arteries to the Limbs", *The Medical Journal of Australia*, Volume I, May 19, 1945, page 517.
- ⁽¹⁷⁾ J. A. Ross: "Removal of Projectile Fragments and Immobilisation of Wounds in Forward Areas", *British Medical Journal*, Volume I, March 10, 1945, page 330.
- ⁽¹⁸⁾ A. R. Shands: "Recent Advances in Surgery. Fractures of the Patella", *Surgery*, Volume XVI, October, 1944, page 591.
- ⁽¹⁹⁾ R. Wood Power: "Gas Gangrene with Special Reference to Vascularisation of Muscles", *British Medical Journal*, Volume I, May 12, 1945, page 656.
- ⁽²⁰⁾ J. M. Yeates: "Injury to the Popliteal Artery", *The Medical Journal of Australia*, Volume I, June 23, 1945, page 638.

THE USE OF A POLYSACCHARIDE OF BACILLUS PROTEUS OXK IN THE DIAGNOSIS OF SCRUB TYPHUS.

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CASTANEDA AND ZIA (1933) showed that the Weil-Felix reaction was dependent on the presence of a minor antigen common to *Bacillus proteus* X19 and the Rickettsia, and that this minor antigen could be extracted in the form of a polysaccharide-like substance. The work described in this report was based on the assumption that a similar relationship exists in the case of *Proteus* OXK and scrub typhus Rickettsia (*Rickettsia orientalis*). An active substance with the properties of a polysaccharide has been isolated from *Bacillus proteus* OXK, and its activity has been demonstrated by direct precipitin tests and by the use of colloidal particles coated with the polysaccharide by the method of Cannon and Marshall (1940).

Method.

The polysaccharide was prepared by the method of Boivin (1933) with minor modifications. *Proteus* OXK organisms were grown on nutrient agar and washed off with distilled water. The suspension was centrifuged. (When in the field no adequate centrifuge was available, about 25% by volume of alcohol, 95% strength, was added. This procedure causes the organisms to clump so that they are easily removed by slow centrifugation.) To each mil of packed organisms, 10 mils of $\frac{M}{4}$ trichloroacetic acid was added, and extraction proceeded for three hours in the icebox. The organisms were centrifuged off and the supernatant fluid was neutralized with a strong solution of sodium hydroxide. Two volumes of alcohol (95%) were added and the flocculent precipitate was centrifuged off, washed in alcohol (70%), dried and dissolved in distilled water (about two mils of water for each mil of packed organisms). This was Fraction I.

To portion of Fraction I, acetic acid was added to make a 1% solution, which was boiled for one hour. The solution was centrifuged, the supernatant fluid was neutralized, solid sodium acetate was dissolved to make a 3% solution, four volumes of alcohol (95%) were added, and the whole was placed in the icebox overnight. The resultant flocculent precipitate was centrifuged, washed with alcohol (70%), dried and dissolved in distilled water, insoluble material being discarded. This is Fraction II.

Colloidal particles were prepared according to the method of Loeb (1922). Colloidal (non-flexible) was poured into a large volume of distilled water and stirred with a glass rod. The gummy mass collecting round the rod was dried and dissolved in acetone to make a 5% solution. Distilled water was added in a fine stream to the colloidal solution, which was vigorously stirred until the solution became milky. The solution was filtered through linen and air bubbled through the suspension until no smell of acetone was left. (If flexible colloidal is used, a sticky mass of castor oil has to be removed at this stage.) The suspension was centrifuged at about 2,500 revolutions

per minute for four minutes, the supernatant fluid was decanted, the sediment was removed to a bottle, and the supernatant fluid was replaced in the centrifuge tube and recentrifuged. This process was repeated six times in all, the pooled deposit forming a dense milky suspension, while the supernatant fluid was discarded. Collodion particle suspensions are sensitive to electrolytes, and all water and apparatus must be electrolyte-free. Sensitized particles were prepared by the addition of concentrated particles to polysaccharide solution until a density approximately equal to 10^9 staphylococci per mil was obtained. This suspension of sensitized particles was placed in the icebox overnight. Three drops of sensitized particle suspension and three drops of varying dilutions of serum were placed in tubes measuring two inches by three-sixteenths of an inch, allowed to stand at room temperature for ten minutes and then centrifuged at about 1,000 revolutions per minute for two minutes. Each tube was then flicked with the same force required to resuspend the particles in the control tube and examined for clumping.

Results.

Fraction I is a slightly opalescent fluid. Precipitin ring tests with typhus convalescent serum give a well-marked ring developing rapidly and easily read. Dilutions up to 1 in 1,000 give a precipitin ring with convalescent serum. When normal serum was used undiluted, about one-third of the tubes showed a faint ring, one-third a very faint ring and one-third no ring at the end of one hour.

By the use of collodion particles sensitized with Fraction I in tests put up in the same manner as in Table I, both

convalescent typhus and normal serum gave titres similar to those obtained by agglutination of intact *Proteus* OXK organisms.

Fraction II is a perfectly clear colourless solution. It gives a definite precipitin ring with scrub typhus serum, but a ring which is harder to read than that produced by Fraction I. Normal serum produced no precipitin rings when the results of tests were read at the end of one hour. Table I gives the results of titration of serial dilutions of the same specimens of serum put up against *Proteus* OXK organisms and particles sensitized with Fraction II.

Discussion.

Bolvin (1934) has extracted polysaccharides from many organisms with trichloroacetic acid. Extracts similar to Fraction I are stated to be antigenic and toxic. Hydrolysis with weak acid gives a solution similar to Fraction II, stated to be non-antigenic, non-toxic and specific. The fractions were not tested for antigenicity, but intradermal injections of Fraction I produced a reaction lasting over forty-eight hours, whereas injections of Fraction II produced no reaction in normal subjects. An increase in specificity on boiling, such as is shown here, is also found in pneumococcal polysaccharides (Professor H. K. Ward, personal communication).

It would appear that the titre of normal serum to *Proteus* OXK is due partly to the polysaccharide component common to the bacillus and the *Rickettsiæ*, the minor antigen, and partly due to the major antigen, since the titre obtained when intact organisms are used is invariably higher than that obtained when the minor

TABLE I.

Serum.	Dilutions. ¹						Control.	Antigen.
	1/20	1/40	1/80	1/160	1/320	1/640		
Normal	0	+	±	—	0	0	—	<i>Proteus</i> OXK.
1	—	—	—	—	0	0	—	Sensitized particles.
Normal	0	+	—	—	0	0	—	<i>Proteus</i> OXK.
2	+	—	—	—	0	0	—	Sensitized particles.
Normal	0	+	—	—	0	0	—	<i>Proteus</i> OXK.
3	—	—	—	—	0	0	—	Sensitized particles.
Normal	0	±	—	—	0	0	—	<i>Proteus</i> OXK.
4	—	—	—	—	0	0	—	Sensitized particles.
Normal	0	+	±	—	0	0	—	<i>Proteus</i> OXK.
5	—	—	—	—	0	0	—	Sensitized particles.
Normal	0	+	—	—	0	0	—	<i>Proteus</i> OXK.
6	+	—	—	—	0	0	—	Sensitized particles.
Normal	0	+	±	—	0	0	—	<i>Proteus</i> OXK.
7	+	—	—	—	0	0	—	Sensitized particles.
Normal	0	+	—	—	0	0	—	<i>Proteus</i> OXK.
8	—	—	—	—	0	0	—	Sensitized particles.
Scrub typhus ..	+	±	—	—	0	0	—	<i>Proteus</i> OXK.
Three months earlier	—	—	—	—	0	0	—	Sensitized particles.
Scrub typhus ..	+	+	—	—	0	0	—	<i>Proteus</i> OXK.
Four months earlier	—	—	—	—	0	0	—	Sensitized particles.
Convalescent scrub typhus	0	0	+++	++	+	+	—	<i>Proteus</i> OXK.
1	0	0	+++	++	++	+	—	Sensitized particles.
Convalescent scrub typhus	0	+++	++	+	+	±	—	<i>Proteus</i> OXK.
2	0	0	++	++	+	±	—	Sensitized particles.

¹ Dilutions stated are the final dilutions in the tube; "0" = not done; "—" = no agglutination; "+" = easily visible to the naked eye; "±" = just visible to the naked eye, easily visible with a lens. The Weil-Felix tests were incubated for three hours at 37° C. and then left overnight in ice-box.

antigen alone is used, while convalescent serum shows the same titre with both antigens.

It is not considered that the precipitin test would offer any advantages for field use over existing methods for the rapid diagnosis of scrub typhus, owing to the necessity for using perfectly clear serum and because of the care required in reading the results. The sensitized particles used gave a sharp endpoint at the same titre as the Weil-Felix reaction and a lower titre for normal serum.

Berger (1943) has suggested the use of colloidion particles, sensitized with Kahn antigen, for the serological diagnosis of syphilis, prepared by a central laboratory. As the method should be applicable to other antigens (for example, Proteus OX19), it is possible that in special circumstances the advantages of a more specific reaction, taking fifteen minutes, may outweigh the disadvantages entailed by the laborious method of preparation. The sensitized particles have a life of about one week in the icebox.

Summary.

1. A specific polysaccharide may be prepared from Proteus OXK by a relatively simple method.
2. A precipitin test with this polysaccharide may be used for diagnosis of scrub typhus.
3. The use of colloidion particles sensitized by specific polysaccharide gives a rapid and more specific titration than the Weil-Felix reaction.

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Bibliography.

- F. M. Berger: "Agglutination Test for Serological Diagnosis of Syphilis", *The Journal of Pathology and Bacteriology*, Volume LV, 1943, page 363.
- A. Boivin, L. Mesrobian and I. Mesrobian: "Technique pour la préparation des polysaccharides microbiens spécifiques", *Comptes rendus des séances de la Société de biologie*, Volume CXIII, 1933, page 490.
- A. Boivin and L. Mesrobian: "Remarques concernant la technique d'extraction du complexe polysaccharidique antigénique renfermé dans le bacille d'aertrycke", *Comptes rendus des séances de la Société de biologie*, Volume CXV, 1934, page 304.
- P. R. Cannon and C. E. Marshall: "Improved Serologic Method for Determination of Precipitative Titers of Antisera", *The Journal of Immunology*, Volume XXXVIII, May, 1940, page 365.
- M. Ruiz Castañeda and S. Zia: "Antigenic Relationship between Proteus X-19 and Typhus Rickettsiae: Study of Weil-Felix Reaction", *The Journal of Experimental Medicine*, Volume LVIII, 1933, page 55.
- J. Loeb: "The Influence of Electrolytes on the Cataphoretic Charge of Colloidal Particles and the Stability of their Suspensions. I. Experiments with Colloidion Particles", *The Journal of General Physiology*, Volume V, 1922-1923, page 109.

Reviews.

ARTERIAL HYPERTENSION.

"ARTERIAL HYPERTENSION: ITS DIAGNOSIS AND TREATMENT", by Page and Corcoran, is one of the general practice manuals published by the Year Book Publishers of Chicago.¹ The authors intend the book "for the care of the patient with arterial hypertension by those whose special interests do not lie exclusively in this field".

In discussing the factors influencing arterial pressure, Ayman and Goldshine are quoted as having shown that 30% of patients gave systolic pressure readings forty millimetres of mercury or more lower when measured in their homes by the patients than when the readings were made at the clinic by the physician.

Hypertension is classified into five headings: renal, cerebral, cardio-vascular, endocrine, unknown. There are fifty-eight causes, listed under the first four headings, yet the fifth (essential and malignant hypertension) comprises 90% to 95% of the total number of hypertensives. The authors consider that, although the view that heredity plays

a vital role in hypertension is appealing, the evidence for proof is insufficient and requires closer investigation.

It is refreshing to find 22 pages devoted to psychotherapy. This section reads as if a psychiatrist has collaborated in its production; it should be read and reread, particularly in conjunction with the chapter on cardiac neurosis, on page 122, which is excellent and of great importance to practitioners. A common-sense régime for the hypertensive is outlined in this chapter, and unnecessary and harmful restrictions (for example, the common fallacy of forbidding red meat and salt) are discussed.

It is clear that the authors expend much time in the treatment of the patient himself and not only of his disease, which, of course, is as it should be. The fight against time is but one example of the bugbears of present-day medical practice. If the physician can spare only a few minutes for the first interview with a hypertensive patient, more harm than good may result, and the patient might be better off without the hurried advice. Psychic tension shortens the length of life, both of the patient and of the physician.

Excellent advice on what to tell the patient who has been found to have hypertension is offered (pages 138 and 139), and due warning is given of the damage that can be (and often is) done to patients by telling them their blood pressure readings. The physiology and pathology of the circulation receive full attention, and it is shown how hypertension accelerates the progress of senescence and speeds the formation of arteriosclerosis. Electrocardiographic interpretation in hypertensive heart disease and coronary disease is briefly described, and the conclusions are on the whole those usually accepted, although some physicians might not be so dogmatic as to the cause of some of the abnormalities shown in the tracings.

The chapter on coronary disease and congestive failure is good, and coronary occlusion is fully dealt with. The clinical description of *angina pectoris* is perhaps not up to the same standard, and we should have liked to see the differential diagnosis discussed, for this condition is important and the diagnosis not always easy.

None of the various theories of the cause of oedema in heart failure convince the authors; they consider that there is an unknown factor concerned. It is pointed out that it is the sodium ion, not the chloride, that causes retention of water in the tissues, and that the usual diet with a low salt content is often inadequate even in hospitals, and that sometimes a sodium salt is given without thought—for example, a dose of bicarbonate of soda for flatulence.

They find no physiological reason to restrict fluid intake in congestive failure. The latter should be treated "without exception" by digitalis, and the "cardinal sin is in giving too little". They believe in the method of rapid digitalization within twenty-four hours. The value of mercurial diuretics in keeping congestive failure at bay for long periods is not stressed, and the danger in their use is perhaps over-emphasized.

In regard to the effects of hypertension on the brain, it is thought that obliterating angiospasm, in spite of the weakness of the media of the cerebral arteries, is a plausible explanation for many clinical phenomena (page 226); but on the next page it is suggested that hypertension may predispose to headache by causing passive dilatation of the cerebral arteries. The authors agree that headache is not due to increased cranial tension.

The oedema of the brain following cerebral vascular damage may be reduced by giving intravenously 300 to 500 millilitres of 50% mannitol solution, as glucose causes a secondary rise of intracranial tension. This is also recommended in hypertensive encephalopathy.

Forty-four pages are devoted to the role of the kidneys in hypertension, and much of the newer work in this field is reviewed. It is pointed out that hypertension of renal origin has been produced experimentally in the absence of renal ischaemia (apart from the well-known hypertension which follows clamping the renal arteries), and that the former is presumed to be due to renal pressor activity. The conclusion is, therefore, that the renal pressor-endocrine and excretory functions are independent of each other.

Recent evidence suggests that hypertension causes renal arteriosclerosis—not *vice versa*. The authors offer their concept of the pathogenesis of essential hypertension "as something less than a working hypothesis, and more than a fancy" (page 251). The disease begins as a generalized arteriolar constriction of neurogenic origin. In the early stages renal blood flow, tubular secretory capacity and glomerular infiltration are all normal. As the result of prolonged vasoconstriction, or more probably of early arteriosclerosis, the renal pressor system then comes into operation—the "humoral pattern"—and the disease becomes self-perpetuating.

¹"Arterial Hypertension: Its Diagnosis and Treatment", by Irvine H. Page, M.D., and Arthur Curtis Corcoran, M.D.; 1944. Chicago: The Year Book Publishers, Incorporated. 8" x 5½", pp. 352, with 14 illustrations. Price: \$3.75, post paid.

Tests of renal functions are considered at some length, including the recent work of Homer Smith (New York University), which provides measurement of renal blood flow, glomerular filtration rate and tubular function by the intravenous use of substances such as "Inulin" and "Diodrast".

There is a section on hypertension and pregnancy. Pre-eclampsia and eclampsia are dealt with, and a table shows the indications for termination of pregnancy. The appendix provides a classification of the toxæmias of pregnancy, as proposed by the American Committee on Maternal Welfare.

The evaluation of thiocyanate therapy occupies a separate section. It is considered that there is no set dosage, and the secretion of the drug is widely variable; therefore it should be used only if regular measurements of the concentration in the blood can be undertaken. The latter should lie between eight and twelve milligrammes of thiocyanate per 100 millilitres of serum. Sixty-six out of 100 patients treated obtained symptomatic relief, which was almost complete in twelve cases. Two of the twelve patients developed myxœdema with thyroid enlargement. Some patients were kept on the drug up to four and a half years.

The authors think that there may be a hopeful field in the use of kidney extracts in the treatment of hypertension. The claim that large doses of vitamin A are effective in treatment has not been confirmed by the authors.

The book ends with a chapter on the surgical treatment of hypertension. In regard to unilateral renal disease with hypertension, an opinion is expressed that nephrectomy is unlikely to relieve the symptoms if the disease has been in progress over two years. The selection of patients is difficult. It is thought unlikely that sympathectomy reduces arterial pressure by specific influence on the mechanism of renal circulation. The operations of supradiaphragmatic and infradiaphragmatic splanchnicectomy are being gradually abandoned in America. The Smithwick operation, which combines the two, is more hopeful. Here again selection is difficult; usually patients over fifty years of age are unsuitable cases.

This book can be recommended with confidence. It fulfils a need, for undoubtedly hypertension is one of the great clinical problems of the age. The authors are to be congratulated, however, on the production of the work to which they have obviously given much thought and time.

THE ENDOCRINES.

The fashion for writing popular scientific works is, if anything, increasing, as a glance at any bookshop will show. Some of these are attempts to be exhaustive and are rather pretentious, but Dr. L. R. Broster in his book on the relations of the endocrine glands to sex make-up is content to deal with the matter simply and attractively.¹ There is an introduction by Sir Peter Chalmers Mitchell, who characterizes some of Dr. Broster's statements as exciting.

The book is essentially a book for the intelligent layman—many medical men would find it rather an old story. There is a careful and logical arrangement which begins with a chapter on evolution of the make-up, both physical and mental, of animals, followed by a very careful discussion of modern views on heredity.

Having given his reader a grounding, Dr. Broster can then pass on to discuss the central argument of his book—the extent to which man's constitution may be considered merely a basket-work of interacting endocrines. He quotes Crile's discussion on the relative size and weights of thyroid and adrenal in the dynamic and static types of animals, for example, the lion against the ox.

The chapter on the endocrine glands is full and well illustrated by clinical examples. It is, however, curious that while many examples are given, that of Fröhlich's syndrome is not quoted as a complex but constant sign of pituitary disturbance. The discussion on the thyroid gland is by far the most complete, and here the relationship of experimental finding to clinical (especially surgical) efforts is discussed very simply and clearly; the most detailed of all the studies, however, is the consideration of the adrenogenital syndrome. Here, too, the work of the surgeon is discussed and the hope of helping some of the embarrassed creatures affected by the syndrome is emphasized.

¹ "Endocrine Man: A Study in the Surgery of Sex", by L. R. Broster, O.B.E., D.M., M.Sc. (Oxon.), F.R.C.S., Hon. F.A.S.A., with a foreword by Sir Peter Chalmers Mitchell, C.B.E., D.Sc., F.R.S.; 1944. London: William Heinemann Medical Books Limited. 8½" x 5½", pp. 155. Price: 12s. 6d. net.

Cushing's syndrome is studied at length, as is feminism, and the mental complications in all these conditions are duly emphasized.

Mongolism is not included among the endocrine diseases. Finally the whole field is summarized in an attempt to present a study of the nature of man—physical and mental—from night-blindness to cretinism. Dr. Broster does not follow Dr. Frederick Wood Jones in his views on inheritance of acquired characteristics, but he admits the disastrous effects of a bad environment.

Altogether this is a very interesting little book and one to stimulate thought—either in agreement or in disagreement.

THE REFLEXES.

DR. ROBERT WARTENBERG, in a small book on the reflexes, has tried to present a simple and comprehensive review of the reflexes in their relation to practical neurological diagnosis.¹ The testing of the reflexes and their evaluation have always been one of the most important parts of the neurological examination. But the nomenclature is chaotic, and there are a staggering number of reflexes with authors' names attached. As Dr. Wartenberg writes: "These authors, anxious to attach their names to a 'new' reflex, have completely neglected the work of their predecessors. The history of reflexes provides an interesting chapter in the book of human vanity."

The author has attempted to bring order out of chaos by naming any given reflex according to the acting muscle and not according to the point of stimulation; this immediately abolishes a mass of unnecessary names. "The deep reflexes are physiologically muscle stretch reflexes and should be so called." After discussing these basic principles, he describes the methods of reinforcement, namely, those that divert the attention of the patient, and those depending on a slight voluntary contraction of the muscles involved in the reflex. This latter the author considers to be the basic principle in any adequate method of reinforcement. Following this there are chapters dealing with 25 individual reflexes.

The book is a difficult one to read, mainly because of the number of surnames mentioned and the frequent references—there are 495 at the end of the book. The volume contains adequate indices and is clearly printed.

INDUSTRIAL NURSING.

The author of "Industrial Nursing: Its Aims and Practice", a small book of 159 pages, has written for her nursing sisters an excellent handbook of industrial nursing practice.² The lessons which she offers are set out in proper sequence and do not lull an unsuspecting nurse into imagining that industrial nursing represents an easy care-free job. The need for special instruction of graduate nurses is recognized in England. The author describes facilities for training in industrial nursing under the auspices of the Royal College of Nursing. After a twelve months' course a successful nurse is awarded Certificate "A", and Certificate "B" after a six months' course. In addition, shorter and part-time courses are available. A synopsis of the courses is given in an appendix.

The first three chapters deal comprehensively with "Scope and Condition of Service", "The Nurse and Factory Personnel" and "Planning and Running a Health Department". The last two chapters, 9 and 10, are concerned with "Record Keeping" and "Cooperation with Organizations Inside and Outside the Factory". These chapters offer formidable and illuminating reading for people interested in factory hygiene. The remaining chapters are concerned with health problems—first aid, the treatment of injuries, and medical emergencies and general factory hygiene. The book is recommended to nurses and to doctors, too, who are interested in industrial health. The author deserves commendation for her work and the publisher thanks for making this book available in good form at a cost of only five shillings net (England).

¹ "The Examination of Reflexes: A Simplification", by Robert Wartenberg, M.D., Foreword by Foster Kennedy, M.D.; 1945. Chicago: The Year Book Publishers Incorporated. 7" x 4½", pp. 234, with seven illustrations. Price: \$2.50, post paid.

² "Industrial Nursing: Its Aims and Practice", by A. E. Dowson-Weisskopf, S.R.N., with a foreword by Dr. Edith Summerskill, M.P.; 1944. London: Edward Arnold and Company. 7½" x 4½", pp. 164. Price: 5s. net.

The Medical Journal of Australia

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All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

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DIETARY DEFICIENCIES AND ORAL STRUCTURES.

In April, 1944, Dr. Douglas Anderson discussed in this journal the tongue in medical diagnosis. He showed first of all that some of the beliefs of past generations of doctors were not founded on fact, and then he discussed in turn the dry tongue, the coated tongue, the denuded tongue, and so on. After indicating the pathological conditions with which the different appearances of the tongue might be associated, he concluded with the words of James Mackenzie: "In health the tongue should be evenly and steadily protruded, moist and of a slightly translucent pale red colour." In a review recently published¹ Isaac Schour and Maury Massler recall the fact that the oral tissues have been called the barometer of the state of nutrition of the body. The oral cavity mirrors the nutritional state of the body in their opinion for two reasons. In the first place the oral tissues range from the simplest to the most highly specialized tissue—mucous membrane on the one hand and the papillae of the tongue, enamel and dentine on the other. Tissues of epithelial origin and tissues of mesenchymal origin may be seen side by side and a wide range of tissue reactions may be seen at any one time. In the second place the oral cavity is one of the internal cavities of the body; its mucosa is continuous with that of the gastrointestinal tract, and yet of all the internal cavities of the body it is the only one that is readily accessible and easily examined without the aid of highly specialized instruments. These facts are easily forgotten; indeed it would not be surprising to discover that many clinicians were not in the habit of looking at the oral cavity with an inquiring eye. Those who do make careful and detailed examination of the mouth of every patient would surely declare that the information obtained by so doing was valuable. They would also hold that the value of the information increased with the length of time during which the habit had been cultivated and with the attention paid to detail. In these circumstances notice should be taken of the paper by Schour and Massler which deals with the effects of dietary deficiencies upon the oral structures.

Schour and Massler point out that nutritional studies should include gross and histological examination of enamel and dentine, of the periodontal structures (the gingivæ, cementum, periodontal membrane and alveolar bone), of the tongue, of the lips and of the oral mucosa. The type of response to any nutritional disturbance is found to vary with the particular dental or oral structure and its stage of development as well as with the specific disturbance and the species studied. For instance, the growing and calcifying enamel and dentine show the nutritional status of the individual and are specially sensitive to variations in calcium intake, to deficiencies in vitamins A, C and D and to fluorine. On the other hand fully formed enamel and dentine "contain the nutritional record of the past". The completed enamel is exposed to the oral fluids and oral flora and is beyond the sphere of systemic nutritional influences. The soft oral structures which grow throughout life reflect the nutritional status of both young and old individuals and are specially sensitive to vitamins B, A and C. The alveolar bone also grows throughout life, and it is affected by disturbances in mineral metabolism. Schour and Massler point out that most of the evidence on the delicate response of tooth development to nutritional disturbance is derived from experiments on animals, and that the findings on the response of the soft oral tissues are derived largely from clinical observations on man. Their article comprises a detailed description of changes that are likely to result from the deprivation of the several elements of a balanced diet. The list of 286 references appended to their paper gives some idea of the enormous amount of ground covered by them. The possible changes described are, it must be admitted, chiefly of academic interest. Deprivation in the diet must seldom, if ever, occur singly; in other words, the diet is seldom lacking in only one essential constituent for a long enough period of time for that lack to produce any obvious abnormality. Not only have pathological appearances due to dietary deficiencies generally a composite origin, but often it will be found that in addition an infective agent has been exerting its influence. The first and most important point to be realized is when a mouth is unhealthy; to do this a practitioner should be able to recognize a healthy mouth when he sees one. This, incidentally, is a sound reason for insistence on the examination of every patient's mouth. At this point it is well to remember the fact, recently emphasized in this journal by N. M. Gutteridge, that many of the chronic deficiency diseases are so common and prevalent that they are regarded as usual or normal. Gutteridge, in regard to the pathogenesis of deficiency disease, referred to the five stages described by Kruse. The first of these was a lowered concentration of the nutrient in the blood, and only in the fifth stage were there produced gross morphological and functional changes recognizable by clinical means. Considered from the clinical point of view these facts are somewhat depressing. But, bearing them in mind, we may turn to some of the more important points brought out in Schour and Massler's review. A deficiency in vitamin A may cause a disturbance in the developing tooth germ in children under six years of age; after that time the crowns of all the teeth are completed. In the adult the possible effect of vitamin A deficiency is limited to the oral epithelium. Deficiencies of vitamins in the B series, unlike those of vitamins A, C and D and the minerals, produce their effects chiefly in the oral soft tissues. Thiamine

¹Physiological Reviews, July, 1945.

produces a sensitivity of the oral tissue, but Schour and Massler think that the experimental and clinical effects on oral tissue of a deficiency of this substance need further elucidation. Deficiency of riboflavin (vitamin B_2) is characterized *inter alia* by a typical glossitis and by cheilosis. The glossitis presents a magenta-coloured and pebbly lesion which is to be distinguished from the scarlet-red, smooth, atrophic glossitis of pellagra. It begins in mild deficiencies as a soreness at the tip or at the lateral margins of the tongue or in both areas. These sites become reddened and glazed because of atrophy of the filiform papillae. The fungiform papillae are engorged or flattened and give the tongue its pebbly appearance. The cheilosis which begins as a raw, red painful area at the commissure of the lips, extends and is covered by a white adherent membrane. This cheilosis is not necessarily a specific sign of ariboflavinosis. Niacin deficiency produces a typical, painful, fiery-red glossitis. This condition, which was fully described by Gutteridge, disappears promptly on the administration of nicotinic acid or its amide. In acute niacin deficiency the entire oral mucosa may be involved. Deficiency in vitamin C produces changes that become obvious in the gingivae. These have been well set out in Gutteridge's paper and need not be described in detail. It should be mentioned, however, that local factors such as trauma, calculus and faulty hygiene, play a significant part in the progress of scorbutic gingivitis and periodontal breakdown. The fact that gingivae affected by a lack of vitamin C form a splendid focus for infection by Vincent's and other types of organism need merely be mentioned. Vitamin D is concerned primarily with calcium metabolism and the calcification of the hard tissues. This subject and that of mineral deficiencies are too extensive to be discussed in detail; in any case they are revealed by radiological examination rather than by inspection. Fluorosis must also be mentioned, though its harmful effect is produced by the ingestion of fluorine in excess in contrast to the effects of the other substances named.

So far no mention has been made of dental caries, a subject which cannot be omitted from any discussion on the health of the oral cavity. As medical practitioners are well aware, divergent views are held about the cause of dental caries. These have been referred to in the editorial columns of this journal on several occasions. A lengthy discussion will be found in the issue of October 21, 1939. It will be remembered that May Mellanby, in a report to the Medical Research Council of Great Britain on the results of her seventeen years' work, showed that diet had a profound influence on the resistance of the tooth. On the other hand we must recall the views of Miller on the results of the retention of suitable carbohydrate food particles at certain sites on the tooth, followed by decomposition through fermentation and the local formation of organic acids, chiefly lactic acid. Again Hansen, Fosdick and Epple, working on reducing sugars, showed that when *Bacillus acidophilus* was grown in symbiosis with *Bacillus aerogenes* or with *Saccharomyces cerevisiae* decalcification proceeded rapidly. Marshall (on whose work our discussion in 1939 was based) thought that the work of Hansen, Fosdick and Epple might be the means of reconciling the opposing views on the flora of the mouth. W. D. Armstrong, in a biochemical and nutritional study in relation to the teeth,¹ mentions several workers who have been unable to

confirm an aetiological relationship between *Lactobacillus acidophilus* and dental caries, but he reports that a high degree of correlation of salivary *Lactobacillus acidophilus* counts with the occurrence of caries has been noted in studies which have established the relationship of resistance to caries and the fluorine content of communal water supplies. The causation of dental caries is of importance if we are dealing only with dietary deficiencies; it is equally important in a discussion on the discovery of healthy mouths, from which prevention and cure cannot well be excluded. Schour and Massler maintain that present evidence has not established a specific nutritional basis for caries or for periodontal disease. They think that caries is largely a problem of food decomposition in the oral cavity rather than of gastro-intestinal absorption. It is therefore interesting to note their insistence on the importance of the physical character of the food. On the one hand food may be detergent and stimulating; on the other, it may be adhesive, retained and impacted and undergo local decomposition. This aspect of the subject is one that should receive more attention than it does. Foods which are hard, coarse and fibrous and cannot be swallowed without being thoroughly chewed, have a natural cleansing action on the tooth surface. It has also been shown that when whole citrus fruits are added to the diet, the bacterial count and bacterial fermentation are much reduced. While we must agree with Schour and Massler that the effects of proteins, fats and carbohydrates upon the teeth and surrounding tissues merit further investigation, and while we recognize that the causation of dental caries is still a vexed problem calling urgently for solution, we have to acknowledge that many data are available to warrant careful study of the oral cavity of every patient coming for examination or treatment. In our study note will be taken, not only of the stigmata of deficiencies in the diet, but also of the handiwork of infective and other types of agent.

Current Comment.

FOAMS AND LIVING TISSUES.

A STUDY of the shapes which bubbles may assume in a froth may seem remote from all practical considerations, but yet it has engaged the attention of a considerable number of biologists, physicists, technicians and mathematicians. At one time in Germany two distinguished experimentalists were busy with researches on foams, one Otto Bütschli, seeking a possible clue to the micro-physiology of protoplasm, the other, Georg Quincke, pursuing his studies in surface tension, particularly the distribution of dissolved matter at interfaces. The facetious students of each professor spread the rumour that the scientific problems had arisen from the contemplation of the head on a mug of beer. Very early in the story of the application of the microscope to living structure was the similarity of cells to bubbles detected. Nehemiah Grew in the second edition of his "Anatomy of Plants", published at London in 1682, likened plant cells to "froth of beer or eggs". This resemblance has been noted in many publications since. A. Robert in 1902 published some striking photographs of bubbles simulating the early cleavage stages of the gastropod *Trochus*.¹ Most biological observers based their views on the two-dimensional aspect of cells as observed on a surface or in a cross-section; it was reserved for F. T. Lewis between

¹ "Annual Review of Biochemistry", Volume XI, 1942, page 441.

¹ Archives de zoologie expérimentale et générale, Third Series, Volume X, 1902, page 269.

1923 and 1933 to make painstaking observations on the three-dimensional shapes of cells in tissues.¹ Physicists had not been idle with soap-bubble theory and this delight of childhood has been the subject matter of whole books.² Then came the brilliant intellect of Lord Kelvin, who from high mathematical theory showed that a bubble surrounded by other and equal bubbles would have 14 faces, a tetrakaidcahedron in fact, eight of these faces being undulating hexagons and six quadrilateral with the sides curved.

In the case of soap bubbles the main factor determining shape is, of course, surface tension, as this necessitates minimal surface; hence the perfect sphericity of an isolated floating bubble. An experimental method of investigating a kindred problem and divorced from surface tension was devised by two American botanists, Marvin³ and Matzke.⁴ They subjected a mass of spherical lead shot to such a pressure that the interstices were obliterated; here a wider range of contacts was found than in the case of bubbles. The three-dimensional shape of bubbles was more the object of mathematical analysis than of experimental inquiry until Matzke attacked the problem by blowing a large number of bubbles of uniform volume by means of a graduated syringe and heaping these together in masses sheltered from temperature changes.⁵ It was found that the peripheral bubbles had each 11 faces, and it is curious to note that F. T. Lewis in 1937 had described 11 facets in epidermal plant cells.⁶ The bubbles which were immersed had on an average 14 faces as Kelvin predicted, but pentagonal faces preponderated and not those already mentioned, the reason being that the conditions in actual experiment can never be exactly the ideal. Cells in living tissues are, according to Matzke, intermediate in shape between bubbles and compressed shot, but there is a closer approach to bubbles in foam. This may be interpreted as indicating that surface forces are operative when the delicate cell walls are laid down but constitute only one of the determining factors. All this may seem very detached from the medical and biological problems of today; but let us not forget the debt modern medicine owes to the researches of a young French chemist, Louis Pasteur, on the rather academic problem of the shapes of crystals. Hitherto in normal and pathological histology the two-dimensional presentation of structure, namely the cross-section, has predominated. One can easily surmise that the three-dimensional shapes of cells in, say, a quickly growing neoplasm may yield information of a practical as well as a high theoretical order.

ARTERIAL EMBOLISM AND THROMBOSIS IN INFANCY.

To be faced with the occurrence of embolism or thrombosis in an infant would doubtless cause very considerable surprise to most practitioners. These conditions are well recognized in adults and have been discussed extensively in medical literature, but in infants have received scant attention. This is pointed out by Robert E. Gross, who reports six examples of the condition in very young children, reviews the cases previously reported, and discusses the likely underlying pathological processes.⁷

Two outstanding impressions remain after reading the paper. The first is that in view of the profound changes that take place in the circulation immediately after birth it is indeed to be wondered at that embolism and thrombosis do not occur more often at this time. These changes are the obliteration of the *ductus arteriosus*, which carries foetal blood from the pulmonary artery to the aorta, and of the umbilical arteries, which are a continuation of the hypogastric arteries and carry the blood from the general

circulation of the foetus to the umbilicus and placenta. In the majority of infants the closure of the *ductus arteriosus* takes place by a process of angulation, degeneration, contraction and scarring without clot formation. Sometimes, however, clot does form in the ends or throughout the whole length of the ductus as it is being closed. Fragments of such a thrombus may become dislodged, enter either the systemic or pulmonary circulation and, being carried as an embolus, cause blockage and thrombosis in an artery. Two of the cases reported by Gross and a number that he reviews from the literature proved on post-mortem examination to have been produced in this way. Gross makes the important point that a closed ductus, even though blood clot is partly responsible for the closure, produces no physical signs, and that this may be the origin of the embolus even though physical examination of the heart reveals no abnormality. An embolus arising here could readily enter the left common carotid or subclavian artery, any branches of the aorta distal to this, or if it became detached from the pulmonary end of the ductus, cause obstruction in the vessels to the lung. The umbilical arteries, from the hypogastric arteries to the umbilicus, close at birth by a process of thrombosis and subsequent degeneration and fibrosis. Normally this thrombosis stops short at the hypogastric arteries, but occasionally proceeds further, and in one case reported by Gross had extended even to the abdominal aorta, causing loss of circulation to both legs and death. Congenital heart disease too may be a cause of embolism; sterile vegetations may form on an abnormal valve or spontaneous clotting may occur because of the polycythemia associated with those forms of congenital deformity of the heart that produce cyanosis. Trauma during birth has sometimes been blamed for thrombosis in a limb, but Gross thinks the association unlikely. Sepsis is the remaining cause of arterial obstruction mentioned. Usually it is localized to small areas with central necrosis due to obliteration of small local arteries by the inflammatory process; obstruction of large arteries occurs only if bacterial endocarditis is present.

The second striking impression made by the article is the great power that infants have to establish a collateral circulation to overcome the effects of so gross a circulatory insult as the blockage of the main artery to a limb. For example, the second case described is that of an infant in whom a few hours after birth it was noticed that the right hand and forearm were cold and very pale, and a little later blue and mottled, no pulsation being palpable in the radial, brachial or axillary vessels. For a week blueness, coldness, loss of power, swelling and lack of pulsation remained unchanged, and the necessity for amputation was strongly considered. Then, however, slow improvement commenced. At seventeen months a radial pulse was felt for the first time, but at twenty-six months the arm and hand were completely normal. Results have not always been so happy. In some cases surgical amputation has been carried out or spontaneous amputation has occurred, and in a number of cases death ensued. The author's advice that surgical amputation should be deferred as long as possible seems undoubtedly sound, for even if auto-amputation results the loss of tissue is likely to be minimal and less than if resort had been made to surgery. Perhaps the most important step in the safeguarding of the affected limb is to maintain scrupulous cleanliness in order to avoid infection of the devitalized tissues. Gross cleans the part with a bland antiseptic and encloses it in a sterile bandage which he changes once or twice daily with aseptic precautions. Heat should not be applied, for it increases the oxygen demands of the tissues, and pressure of all sorts should be avoided, for pressure increases the risk of necrosis.

Arterial obstruction has occurred in the brain, the kidneys, the mesentery, the lungs, the arms, and especially the legs of infants. The outlook of many of these subjects is serious and indeed half the patients reported died; but the author's observations provide good evidence that "if an ischaemic limb can be tided over its period of initial insult, there is a fairly good chance that it will survive and regain satisfactory function".

¹ *Proceedings of the American Academy of Arts and Sciences*, Volumes LVIII, LXI and LXVIII.

² For example: "Soap Bubbles and the Forces which Mould Them", by C. V. Boys, 1890.

³ *American Journal of Botany*, Volume XXVI, 1939, page 280.

⁴ *American Journal of Botany*, Volume XXVI, 1939, page 288.

⁵ *Proceedings of the National Academy of Sciences of the U.S.A.*, Volume XXXI, 1945, page 281.

⁶ *Science*, Volume LXXXVI, 1937, page 609.

⁷ *American Journal of Diseases of Children*, August, 1945.

Abstracts from Medical Literature.

PATHOLOGY.

Giant-Cell Pneumonia with Inclusions.

HENRY PINKERTON, W. L. SMILEY AND W. A. D. ANDERSON (*The American Journal of Pathology*, January, 1945) report that in five cases of Hecht's giant-cell pneumonia in infants, cytoplasmic and nuclear inclusions were found in lung tissue in four cases, while in a fifth case cytoplasmic inclusions alone were observed. The inclusions are found in bronchiolar epithelium, in alveolar lining cells and in giant cells arising from the latter two types of cells. Both cytoplasmic and nuclear inclusions are of the type associated with virus activity. The cytoplasmic inclusions are multiple, often vacuolated, and show considerable variation in size and shape, while the nuclear inclusions are usually single, rarely filling more than one-third of the nucleus, and relatively constant in size and shape. The cytological picture presented by this combination of cytoplasmic and nuclear inclusions is identical with that seen in distemper in dogs and other lower animals, and is quite unlike that seen in any other known type of virus infection. It is generally believed to be diagnostic of distemper in animals. The virus of distemper in minks, ferrets and foxes causes an interstitial pneumonia in which giant-cell formation from alveolar and bronchiolar lining cells is a prominent feature. In several instances, giant cells of this type were found in large numbers, and the histological picture of giant-cell pneumonia appeared to be duplicated in every detail. As in the cases of human giant-cell pneumonia, the inclusions were located in bronchiolar and alveolar lining cells, and in the giant cells. In sections from two of six fatal cases of clinically typical measles an identical picture of giant-cell pneumonia with nuclear and cytoplasmic inclusions was found. Possible interpretations of the authors' observations are: (i) that giant-cell pneumonia is a lesion caused by the measles virus, which may occur with or without the usual clinical manifestations of measles; and (ii) that giant-cell pneumonia is caused by another virus which may act independently or in association with the measles virus. In either case, the histological and cytological identity of the pulmonary lesions of giant-cell pneumonia with those of canine distemper suggests that there is a close biological relationship between the two diseases.

Primary Splenic Neutropenia.

A CASE that fulfils the clinical criteria of primary splenic neutropenia was observed by H. Milton Rogers (*Archives of Internal Medicine*, March, 1945). This is the eighth case of that disease reported in the literature. The predominating features were profound neutropenia, thrombopenia, splenomegaly and myeloid hyperplasia of bone marrow. Cure was effected by splenectomy. The presence of hepatic

damage associated with primary splenic neutropenia is reported for the first time. This complication occurring with primary splenic neutropenia does not contraindicate splenectomy. The details of the microscopic appearance of the spleen in the author's case varied to some extent from those in the previously reported cases. Primary splenic neutropenia, as well as thrombopenic purpura, congenital haemolytic icterus and Banti's disease (thrombosis of the splenic vein), is a clinical indication for splenectomy.

Occlusion of the Hepatic Veins.

OCCLUSION of the hepatic veins, as discussed by Mavis P. Kelsey and Mandred W. Comfort (*Archives of Internal Medicine*, March, 1945) may be primary or secondary to inflammatory, cirrhotic and neoplastic diseases of the liver, to thrombosis of the neighbouring vena cava, to diseases in which thrombosis occurs frequently, such as *polycythemia vera*, and perhaps to the slowing of the circulation in debilitating diseases. It may or may not produce recognizable signs and symptoms. It is most often merely an incidental observation at necropsy, but it should be suspected when an acute painful episode with shock occurs during an otherwise chronic course, particularly of hepatic disease. Occlusion of the hepatic veins is of interest not only because of its rarity, but also because of the profound physiological changes which it causes in the liver. These changes are attributable to congestion and atrophy of the liver and to obstruction of the flow of blood through the liver with consequent portal hypertension. In chronic occlusion of the hepatic veins, while acute episodes with shock may punctuate or terminate the course, the mechanical effects of obstruction of the hepatic veins are the well-developed features, that is, hepatosplenomegaly, visible collateral circulation and ascites. Thrombosis of the portal vein often occurs, and thrombosis of the mesenteric vein with infarction of the small bowel also may occur. The enlarged, congested liver may become atrophic. In the acute form of the disease and in the acute terminal episodes of the chronic form the more dramatic features of shock with cyanosis and acidosis are added to those of hepatic and portal obstruction and ascites. Hypoglycaemia with hypoglycaemic convulsions has been noted experimentally and may be anticipated sooner or later in clinical experience.

Tumours of the Thymus in Myasthenia Gravis.

ACCORDING to a report by Nelson A. Murray (*American Journal of Clinical Pathology*, March, 1945), most primary tumours of the thymus associated with *myasthenia gravis* are of a single type, and histological variations are of minor importance. These tumours are made up of lymphocytes and larger pale cells that have faintly acidophilic cytoplasm in varying proportions and indefinite cell boundaries. They contain numerous small blood vessels and occasional Hassall's corpuscles. A "lining up" or palisading of the pale cells along connective tissue trabeculae and pseudo-rosette formation around blood vessels appear to be distinguishing features. Mitotic figures are rarely

encountered in these tumours. If metastasis and direct extension are sufficient criteria for the diagnosis of malignancy, then these tumours are, according to the author, malignant. At the present time, it is believed that "thymoma" is an adequate name for these tumours. Those which will metastasize cannot be distinguished on a histological basis from those which will not metastasize. Consequently, one cannot offer a definite prognosis from the microscopic study of the tumour alone. The absence or presence of secondary germ centres (lymph follicles) in a given thymus does not point either to or away from malignancy. The absence of differentiation between cortex and medulla is not a reliable criterion for the diagnosis of malignancy. The calcification and degenerative changes seen in these tumours may or may not be the result of X-ray therapy. The incidence of *myasthenia gravis* among patients suffering from thymoma is nearly 100%.

The Comparative Value of Several Liver Function Tests.

ACCORDING to Myer Teitelbaum, Arthur C. Curtis and S. Milton Goldhamer (*Annals of Internal Medicine*, May, 1945), the best tests for the estimation of hepatic function in patients who are jaundiced are the serum protein determination (hypoalbuminemia) and the glucose tolerance test. Invariably such patients will have had a Van den Bergh test already performed. For patients who are not jaundiced, it appears that the best tests to use are the bromsulphalein dye excretion test and the urobilinogen test. In the investigation of these patients the Van den Bergh test, too, will already have been performed. In either situation, other tests may well add further information regarding the degree of impairment of hepatic function. The value of any liver function test is directly proportional to an appreciation of the function or functions it is testing. No one test should be regarded as the best test of liver function. The proper interpretation of a combination of these tests for specific functions will tell much about hepatic function and the degree of its impairment. Repetition of certain of these tests from time to time in the course of the disease will further tell whether the disease in the liver is progressing, retrogressing or stationary.

Intercapillary Glomerulosclerosis.

ACCORDING to Irving I. Goodof (*Annals of Internal Medicine*, March, 1945) intercapillary glomerulosclerosis is recognized by the presence of dense hyaline material located in the glomeruli between capillary loops. It is most commonly present near the periphery of the glomerular tuft, and in many instances is associated with advanced thickening of the wall of the afferent arteriole. Occasionally the focal masses of hyaline material are present at many points in the glomeruli, and, indeed, when large enough a single mass may occupy over half the volume of the glomerulus. The lesion is diffuse in most instances, and if the condition is present to any extent it is common for most of the glomeruli to be involved in some degree. Thus, in the grading

of the severity of the disease, the number of glomeruli involved is unsatisfactory as an index. It would appear to be more reliable to consider the relative amount of hyaline material in each mass, and the extent of involvement of the individual glomeruli. In this study a lesion is considered of slight degree when no large hyaline masses are present and the glomeruli contain only small deposits of material between the capillary loops. These deposits are most commonly located at the periphery of the glomerulus, but are occasionally noted elsewhere. A lesion of advanced grade is one in which almost every glomerulus contains one or more large hyaline masses. The remainder are considered lesions of moderate degree. Intercapillary glomerulosclerosis occurs in 44% of diabetic patients. Women are more likely to show the lesion than men, in a ratio of 10:7. It is more prevalent in patients whose diabetes is of longer duration, and who are in older age groups. There is no association with treatment with insulin. Of non-diabetic individuals over seventy years of age, 30% have mild lesions of intercapillary glomerulosclerosis. None are present in a group of non-diabetic patients between five and twenty years of age. Mild lesions are present in 10% of the population as a whole. Advanced lesions are present only in patients with *diabetes mellitus*.

MORPHOLOGY.

Blood Vessels of Nervous Tissue.

E. SCHARRE (*Quarterly Review of Biology*, December, 1944) has described an investigation on the micro-anatomical relations between the cells of the brain and the blood vessels. In all vertebrates studied, and in some invertebrates which possess intraganglionic blood vessels, the cerebral vascularization may follow one of two patterns. The capillaries either form a continuous network, as, for instance, in the placental mammals; or they end in non-anastomosing loops, as in the opossum and in the marsupials in general. In the latter case, the brain is vascularized by true end-arteries. The role of end-arteries in selective vulnerability of certain parts of the brain, such as the hippocampus, has been studied. The area of supply of single vessels has been demonstrated in the opossum. The arrangement of the blood vessels in the brain is, as a rule, determined by the distribution of the nerve cells. But the latter may be determined in certain cases by the blood vessels, as, for instance, in the optic lobe of the squid. A marked economy is observed in the vascularization of the brain, in that capillary density varies according to the needs of different localities in the brain. There is evidence that the synapses and their different requirements determine the varying capillary density in the brain.

Anomalous Hamstring Muscles.

D. J. GRAY (*The Anatomical Record*, January, 1945) describes two anomalous arrangements of the hamstring muscles in man. In one subject the hamstring muscles of the left side all originated

from a common tendon which was attached to the sacro-tuberous ligament, the femur, the ischium, the *quadratus femoris* muscle and the fascial sheath of the piriformis muscle. The homology of this muscle arrangement is obscure. In a second subject a muscle, bilaterally present, originated from the *linea aspera* and passed medially to insert into the dorsal part of the capsule of the knee joint. This muscle is presumably homologous with the femoral head of the semitendinosus muscle of birds.

Absorbing Cells of the Small Intestine.

V. M. EMMEL (*The Anatomical Record*, January, 1945) shows that the histo-phosphatase method of Gomori reveals a sharp localization of alkaline phosphatase in the cuticular border and in the Golgi zone of the cells of intestinal epithelium. This apparently unique characteristic of the intestinal epithelium is undoubtedly related to the specialized activity of the absorbing cells. The importance of phosphorylation in the metabolism of carbohydrates and fats suggests that the Golgi zone in these cells may be a region of particular importance in the passage of these substances through the intestinal epithelium.

Argentaffin Cells of the Stomach.

A. B. DAWSON (*The Anatomical Record*, January, 1945) emphasizes the confusion in the literature regarding the presence, number and distribution of argentaffin cells in the mucosa of the digestive tract in mammals, especially in that of the stomach. Accordingly he conducted an extensive investigation on the mucosa from the various parts of the alimentary tracts of the common laboratory animals, giving special attention to that of the stomach. He used a special modification of the Bodian protargol method and showed that argentaffin cells are uniformly present in the stomachs of this group of animals, namely, rat, rabbit, guinea-pig, mouse and hamster. This group of animals can be arranged on the basis of relative concentrations of argentaffin cells in the fundic mucosa, in the following descending order: rat, rabbit, guinea-pig, mouse and hamster.

Efficiency of Intramuscular Arterial Anastomoses.

W. E. LE GROS CLARK AND L. B. BLOMFIELD (*The Journal of Anatomy*, January, 1945), using bromo-phenol blue as an indication of the effective vascularization of muscle tissue, have studied experimentally in rabbits the results of interrupting the blood supply to muscles. The efficiency of intramuscular anastomoses varies in different muscles. For example, in the case of the *tibialis anterior* of the rabbit, which receives two main arteries of supply, ligation of the lower artery leads to a temporary devascularization of the distal half of the muscle with necrosis of muscle fibres. Partial interruption of intramuscular vascular channels in the *tibialis anterior* or the semimembranosus leads to localized areas of devascularization. Necrotic areas in the devascularized muscles of rabbits are rapidly replaced by

regenerated muscle fibres, leading to a partial reconstitution of the muscle. Experimental gunshot wounds involving the thigh muscles of rabbits may give rise to circumscribed patches of devascularization extending some distance from the track of the missile. The practical importance of a knowledge of intramuscular vascular patterns in human muscles is emphasized.

Meningeal Relations of Hypophysis.

S. SUNDERLAND (*The Journal of Anatomy*, January, 1945) has studied macroscopically the relationship of the meninges to the human hypophysis in a series of seventy-six adult dissecting room specimens and microscopically in seven post-mortem specimens obtained from infants, in which the gland and surrounding structures, bony and neural, had been removed *en bloc* and prepared for histological examination. Attention is drawn to the large size of the aperture in the *diaphragma sellae* which is usually only partly occupied by the infundibulum and *pars tuberalis*. The residual lumen is closed and the fossa completely sealed off by the reflexion of the pia from these structures to the margins of the aperture. Only occasionally is the dura firmly applied to the structures passing through it. This pial reflection assists in the formation of the perihypophyseal capsule. In infancy and childhood there is normally no arachnoid membrane below the level of the dural aperture, owing to its closure by the pia and the gland, and consequently there is no extension of the subarachnoid space into the pituitary fossa. In adult life, and more particularly when there is atrophy of the gland with advancing age, the gland sinks into the fossa. This has the effect of enabling the pia, arachnoid and subarachnoid space to descend through the aperture and ultimately to extend over the entire upper surface of the gland or even completely around the body should the factors responsible for the altered relationships in the fossa continue to operate. The type and amount of glandular tissue establishing a relationship with the subarachnoid space, in the absence of any intervening dura, vary over very wide limits, but depend on the size of the aperture in the *diaphragma sellae* and the degree of penetration of the leptomeninges into the fossa. The bearing of the anatomical arrangement on the paths by which the secretory products of the different parts of the gland may be discharged is briefly discussed.

Carrying Angle of Human Arm.

W. B. ATKINSON AND H. ELFTMAN (*The Anatomical Record*, January, 1945) have measured the carrying angle in a large group of men and women to test the generally believed statement that it is greater in the female than in the male, and hence can be considered a secondary sex character. In 105 males, the angle varied between 3° and 28°, with a mean of 14°, while in 112 females the range was 6° to 29°, with a mean of 16.2°. The author is of the opinion that although the difference of 1.8° is statistically significant, it is too small to be of practical value as a secondary sex character in view of the wide range of variation and extensive overlapping of both sexes.

British Medical Association News.

ANNUAL MEETING.

THE annual meeting of the Victorian Branch of the British Medical Association and of the Medical Society of Victoria was held at the Medical Society Hall, Albert Street, East Melbourne, on December 5, 1945, Dr. JOHN DALE, the President, in the chair.

ELECTION OF OFFICE-BEARERS AND MEMBERS OF COUNCIL.

The Medical Secretary announced that the Council had elected the following office-bearers:

President: Professor P. MacCallum.
Vice-Presidents: Brigadier F. Kingsley Norris and Lieutenant-Colonel A. E. Coates.
Chairman of Council: Dr. H. C. Colville.
Honorary Treasurer: Dr. J. A. Cahill.
Honorary Secretary: Dr. Roy F. Watson.
Honorary Librarian: Dr. Guy Springthorpe.

The Medical Secretary announced that the following had been elected members of the Council by the general body of members: Dr. A. Brown, Dr. C. Byrne, Lieutenant-Colonel A. E. Coates, Dr. H. C. Colville, Dr. John Dale, Dr. J. H. Gowland, Dr. J. S. Green, Air Vice-Marshal T. E. V. Hurley, Dr. L. W. Johnston, Professor P. MacCallum, Brigadier F. Kingsley Norris, Dr. Kenneth Smith, Dr. R. Southby, Dr. Douglas Thomas.

The Medical Secretary announced that the following had been elected by the subdivisions: Dr. H. Boyd Graham, Dr. Guy Springthorpe, Dr. Henry Searby, Dr. F. McAree, Dr. G. Raleigh Weigall, Dr. M. H. Box, Dr. L. A. Neal, Dr. R. Watson, Dr. J. A. Cahill, Dr. B. D. Fethers, Dr. F. J. Bonnin, Dr. G. V. Davies, Dr. R. B. Knox, Dr. F. W. Grutzner, Dr. W. Sloss, Dr. A. B. Hewitt, Dr. D. A. Carter, Dr. P. Goodman.

The Medical Secretary announced that the *ex-officio* members of the Council were: Dr. F. L. Davies, Dr. C. H. Mollison, Dr. J. Newman Morris, Dr. D. Roseby (Trustees of the Medical Society of Victoria), Dr. J. P. Major (Director, Australasian Medical Publishing Company, Limited).

The representative of the Victorian Medical Women's Society was Dr. Elizabeth McComas.

Dr. W. G. D. Upjohn was coopted to the Council.

ANNUAL REPORT OF THE COUNCIL.

The annual report of the Council which had been circulated among members was received and adopted. The report is as follows:

The Council of the Branch and the committee of the society present the sixty-sixth annual report of the Branch and the ninetieth of the society.

As it is still necessary to observe economy in the use of paper, this report, compared with those of former years, has been abbreviated in the same way as that of last year, although the work of the subcommittees, sections and subdivisions has continued during the year.

Election.

At the annual meeting held last December the following members of the Council and of the committee were elected: Dr. Arthur Brown, Dr. Charles Byrne, Dr. H. C. Colville, Dr. John Dale, Dr. D. M. Embelton, Dr. J. H. Gowland, Dr. J. S. Green, Dr. L. W. Johnston, Dr. E. I. Littlejohn, Professor P. MacCallum, Dr. F. Kingsley Norris, Dr. Kenneth Smith, Dr. R. Southby, Dr. Douglas Thomas.

The following were elected to represent the subdivisions: Dr. F. J. Bonnin, Dr. M. H. Box, Dr. J. A. Cahill, Dr. D. A. Carter, Dr. G. V. Davies, Dr. B. D. Fethers, Dr. P. Goodman, Dr. H. Boyd Graham, Dr. F. W. Grutzner, Dr. A. B. Hewitt, Dr. R. B. Knox, Dr. F. E. McAree, Dr. L. Neal, Dr. Henry Searby, Dr. W. Sloss, Dr. Guy Springthorpe, Dr. R. Watson, Dr. G. R. Weigall.

Under Rule 9 of the Branch, Council elected Dr. Elizabeth McComas, who was nominated by the Victorian Medical Women's Society.

The following are *ex-officio* members: the trustees of the Medical Society of Victoria (Dr. F. L. Davies, Dr. C. H. Mollison, Dr. J. Newman Morris and Dr. D. Roseby) and the representative of the Australasian Medical Publishing Company, Limited (Dr. J. P. Major).

Cooptation.—At its first meeting the Council coopted Dr. W. G. D. Upjohn and Dr. E. Ettelson. Air Vice-Marshal T. E. V. Hurley was coopted a member at the July council meeting.

The Council elected the following office-bearers:

President: Dr. John Dale.

Vice-Presidents: Professor P. MacCallum and Brigadier F. Kingsley Norris.

Chairman of Council: Dr. H. C. Colville.

Honorary Secretary: Dr. R. F. Watson.

Honorary Treasurer: Dr. C. H. Mollison.

Honorary Librarian: Dr. Guy Springthorpe.

The executive consisted of the president, the immediate past president (Dr. D. Roseby) and other office-bearers.

Attendances at Council Meetings.

Eleven ordinary meetings and four special meetings of the Council were held. The following shows the attendances.

Dr. John Dale 15	Dr. L. A. Neal 9
Dr. R. F. Watson .. 15	Dr. F. Kingsley Norris 9
Dr. M. H. Box 14	Dr. J. H. Gowland .. 8
Dr. J. A. Cahill 14	Dr. J. Newman Morris 8
Dr. H. Boyd Graham .. 14	Dr. Guy Springthorpe 8
Dr. Elizabeth McComas 14	Dr. W. G. D. Upjohn .. 8
Dr. Kenneth Smith .. 14	Dr. P. Goodman 7
Dr. Robert Southby .. 14	Dr. A. B. Hewitt 7
Dr. G. R. Weigall 14	Dr. E. I. Littlejohn .. 5
Dr. D. A. Carter 13	Dr. F. E. McAree 5
Dr. H. C. Colville .. 13	Dr. G. V. Davies 3
Dr. F. L. Davies 12	Dr. J. P. Major 3
Dr. J. S. Green 12	Dr. D. J. Thomas 3
Dr. L. W. Johnston .. 12	Dr. Arthur Brown .. 1
Dr. David Roseby .. 12	Dr. T. E. V. Hurley .. 1
Dr. E. M. Ettelson .. 12	Dr. F. J. Bonnin 0
Dr. B. D. Fethers .. 11	Dr. F. W. Grutzner .. 0
Dr. C. H. Mollison .. 11	Dr. R. B. Knox 0
Dr. C. Byrne 9	Dr. Henry Searby 0
Dr. D. M. Embelton .. 9	Dr. W. Sloss 0
Professor P. MacCallum 9	

The highest attendance at any one meeting was 30, and the average attendance was 23.

Appointment of Subcommittees.

The following subcommittees were appointed by the Council at the beginning of the year (the first-named acting as convener of the subcommittee):

Ethics: Dr. F. L. Davies, Dr. Cahill, Dr. Graham, Dr. Green, Dr. Major, Dr. Morris, Dr. Smith and the executive.

Finance, House and Library: Dr. Mollison, Dr. Cahill, Dr. Smith and Dr. Springthorpe.

Legislative: Dr. Dale, Dr. Colville, Dr. F. L. Davies, Dr. Gowland, Dr. Green, Dr. Littlejohn and Dr. Watson.

Organization: Dr. Watson, Dr. Roseby, Dr. Cahill, Dr. Colville, Dr. Box, Dr. Brown, Dr. Byrne, Dr. Dale, Dr. Fethers, Dr. Gowland, Dr. Graham, Dr. Green, Dr. Ettelson, Dr. Johnston, Dr. Littlejohn, Dr. McAree, Dr. McComas, Dr. Neal, Dr. Searby, Dr. Smith, Dr. Southby, Dr. Springthorpe, Dr. Weigall, and representatives of the country subdivisions.

Science: Professor MacCallum, Dr. Graham, Dr. Johnston, Dr. McAree, Dr. Searby, Dr. Springthorpe and Dr. Watson.

Hospital: Dr. Graham, Dr. Colville, Dr. Embelton, Dr. Ettelson, Dr. Neal, Dr. Smith, Dr. Southby, Dr. Watson and Dr. Weigall.

Correspondence: Dr. Colville and Dr. Watson.

Workers' Compensation: Dr. Byrne, Dr. Colville, Dr. Gowland and Dr. Searby.

Publicity: Dr. Dale, Dr. Springthorpe, Dr. Ettelson and the Medical Secretary.

Rehabilitation: Dr. Johnston, Dr. Graham, Dr. Norris, Professor MacCallum, Dr. Smith, Dr. Thomas and Dr. Weigall.

Membership Roll.

The number of members on the roll at October 31, 1945, was 1,847, which is 127 more than last year. One hundred and seventy-five names were added (117 by election, 6 members were reinstated by payment of arrears, 20 members were transferred from other States, and 32 members who

¹ Appointed during the year.

were prisoners of war and whose membership was suspended were reinstated) and 48 names were removed (18 by death, 7 by resignation, 20 by transfer to other States, and three members allowed their subscriptions to fall into arrears).

Honorary medical members number 31.

Provisional members number 11.

The death of the following members and former members is recorded with regret: Dr. E. Buller Allan, Sir James Barrett, Dr. G. F. Beck, Dr. Thomas Cherry, Dr. P. G. Clarke, Dr. R. W. Cooper, Major-General R. M. Downes, Dr. D. P. Greenham, Dr. G. H. Guthridge, Dr. G. A. Hagenauer, Dr. H. Talbot Hamilton, Dr. T. W. Hoggarth, Dr. T. R. Jagger, Dr. N. A. Longden, Dr. J. J. McMahon, Dr. J. T. Mitchell, Dr. J. W. Morgan, Dr. J. T. Murphy, Dr. Charles Perry, Dr. D. C. Pigdon, Dr. H. N. Puckle, Dr. A. P. Tenny, Dr. W. J. Trehwella, Dr. O. R. Trumpy, Dr. W. E. Tulloch, Dr. W. Atkinson Wood, Dr. Minnie F. Varley.

Following the deaths of Major-General R. M. Downes and Sir James Barrett, the following minutes were recorded by the Council:

The Council of the Victorian Branch of the British Medical Association records with deep sorrow the death of Major-General Rupert Major Downes, C.M.G., V.D., M.D., M.S., F.R.A.C.S., who served his country for more than fifty years. Commencing his military career at the age of nine years in the artillery, he served with distinction as D.D.M.S., Desert Mounted Corps, in the war of 1914-1918, and then during the difficult years of peace rose to the highest medical post in our army—Director-General of Medical Services—and there, by his enthusiasm and personal direction, stimulated and guided the training of those medical officers who were later to bear the heat and burden of the days of battle.

His directness, his robustness, his disdain of intrigue in any form, were his inspirational qualities to a rare degree, and the success of the Medical Service in this war must be credited to Rupert Downes. As army medical historian he desired to see for himself the conditions of the New Guinea campaign, and on the way he lost his life, dying as he had lived—on service.

For many years Rupert Downes served on the Council of the Victorian Branch of the British Medical Association, ultimately as president. The Council expresses its sincere sympathy to Mrs. Downes and her family.

"He indeed is of great stature, whose shadow reaches to posterity."

The Council of the Victorian Branch of the British Medical Association records with regret the death of Sir James William Barrett, K.B.E., C.B., C.M.G., M.D., M.S., F.R.C.S., LL.D., C.M.Z.S., who died on April 6, 1945, after a life-time of public service.

Professionally he will be remembered as a distinguished ophthalmologist, while in public life he held a great many offices, including that of Chancellor of the University of Melbourne.

The Victorian Bush Nursing Association remains as one of the greatest monuments to his memory, and the British Medical Association was honoured by his appointment as president in 1935.

The Council offers its sympathy to Lady Barrett and the family of the late Sir James Barrett.

The deaths of Mr. C. Stanton Crouch and Mr. William Ramsay were also noted with regret by the Council, as they were both closely associated with the Branch for many years, the former as secretary from 1914 to 1934, and the latter as managing director of the British Medical Agency from its reorganization in 1929.

Roll of Honour.

Died on Service.

Major Eric Bailhache, Flight-Lieutenant W. R. Broderick, Major J. F. Chambers, Lieutenant-Colonel Eric Cooper, Captain W. G. Cuscaden, Captain J. F. Davies, Captain C. S. Donald, Surgeon Lieutenant J. M. Gaskell, Surgeon Lieutenant-Commander F. H. Genge, Surgeon Commander J. R. Hasker, Captain J. C. R. Joyce, Captain G. L. Lindon, Flight Lieutenant F. H. Lord, Major H. F. G. McDonald, Surgeon Lieutenant W. J. McLaren-Robinson, Major N. V. McKenna, Surgeon Lieutenant D. N. McKenzie, Lieutenant-Colonel C. P. Manson, Captain A. D. Mawson, Captain J. F. Park, Colonel D. C. Pigdon, Captain D. J. Shale, Major Z. Schwartz, Flight Lieutenant Stuart Thomson, Major C. E. Watson, Captain S. I. Weir.

Missing on Service.

Surgeon Lieutenant-Commander E. M. Tymms, Captain H. N. Silverman.

Prisoners of War.

Of the 36 Victorian doctors who were prisoners of war, 34 are safe and the majority have now returned to Australia. The Council had great pleasure in welcoming them home and is proud of the way they maintained the high tradition and enhanced the prestige of the medical profession and of the Australian Army Medical Corps while in the hands of the Japanese.

It was with regret that it was learned that Colonel D. C. Pigdon died of illness while a prisoner, and that Dr. R. W. Cooper, a member of the civil administration at Rabaul, was interned by the Japanese and lost at sea in July, 1942.

Honours Conferred by His Majesty the King for Services Rendered during the Present War.

C.B.: Air Vice-Marshal T. E. V. Hurley, C.M.G., V.D.
C.B.E.: Brigadier H. C. Disher, Brigadier H. G. Furnell, D.S.O., Colonel A. H. Green, Brigadier W. Halles, D.S.O., Colonel J. G. Hayden, Brigadier W. W. S. Johnstone, D.S.O., M.C., Brigadier F. K. Norris, D.S.O., E.D., Colonel N. L. Speirs.

D.S.O.: Lieutenant-Colonel K. J. J. Dorney, Colonel W. W. Lempriere, Major F. Douglas Stephens.

O.B.E.: Surgeon Lieutenant-Commander J. S. Guest, Colonel C. W. B. Littlejohn, M.C., Lieutenant-Colonel W. Refshaug, Wing Commander S. F. Reid, Lieutenant-Colonel R. Smibert, Lieutenant-Colonel J. Glyn White.

M.B.E.: Flight Lieutenant J. Grantley Shelton, Lieutenant-Colonel J. O. Smith, Colonel Ian Wood.

D.S.C.: Surgeon Lieutenant-Commander E. M. Tymms.

M.C.: Major J. F. Connell, Major V. E. Sampson.

Meetings of the Branch.

The following meetings were held:

February—"The New Guinea Campaign", Brigadier F. K. Norris.

March—"The Clinical Aspects of Tuberculosis", Dr. Hilary Roche.

April—"The Fifth Embley Memorial Lecture, 'If Embley were to Return'", Dr. Geoffrey Kaye.

May—"Poverty, Housing and Health", Mr. W. Oswald Burt, of the Housing Commission of Victoria.

June—A symposium on "Problems Common to the Medical and Dental Professions", at which the speakers were Dr. J. P. Walsh and Dr. H. R. Cash (Australian Dental Association) and Dr. C. J. O. Brown and Dr. M. C. Davis (British Medical Association).

July—A symposium on alcohol, at which the speakers were Dr. F. H. Shaw, Professor P. MacCallum and Dr. J. K. Adey and Dr. Guy Springthorpe.

August—A general discussion, opened by the Medical Secretary, on the future of the staffing of public hospitals in Victoria.

September—The first R. H. Fetherston Memorial Lecture, "The Prevention of Maternal Mortality in Childbirth", by Dr. A. M. Wilson.

October—The twelfth Sir Richard Stawell Oration, "The Medical Aspects of Red Cross Work in the Second World War", Dr. J. Newman Morris.

November—"Problems in the Treatment of Peripheral Nerve Injuries", Professor Sydney Sunderland.

Clinical Meeting.—In April a clinical meeting was held at the Heidelberg Military Hospital by courtesy of the Director-General of Medical Services, Major-General S. R. Burston.

Business of Council.

During the year it became obvious that the Commonwealth Government was determined to persist with the introduction of the *Pharmaceutical Benefits Act* in a form quite unacceptable to the medical profession, and it was decided to test the constitutionality of the act. This was done by the issue of a High Court writ by the Attorney-General of Victoria on the relation of office-bearers of the Medical Society of Victoria. The case was heard in October, but the High Court has not yet given its decision.

Further intrusion of the Commonwealth Government into medical affairs has resulted from the passage of the *Hospitals Benefits Act*, under which it is proposed to pay subsidies to public and other hospitals, provided all "means

tests" in public institutions are abolished. The position was discussed by members at a special meeting of the Branch and at subdivisional meetings, and it was decided by both the Branch and Federal Councils to advise the profession throughout Australia not to take any steps at present to terminate the existing system of honorary medical service.

A new departure in hospital services in Victoria is the reopening of the old Royal Melbourne Hospital as the Central Hospital, a general section of which is to be opened for patients in the "middle income group", staffed by full-time and part-time salaried medical officers. The Branch Council is closely watching the implications of this innovation.

Representatives of the Council took part in a deputation to the Public Service Board advocating an increase in salaries of medical officers employed by the Government of Victoria, and a recent announcement discloses that such salaries have been increased, but the position is not yet satisfactory.

Following a conference with the Committee of the Yallourn Medical and Hospital Society, improved conditions have been obtained for the medical officers employed by that society.

Attention has been given to the rehabilitation of medical officers discharged from the services, and Council is very appreciative of the assistance given by the Melbourne Permanent Post-Graduate Committee and the Victorian Medical Coordination Committee.

To further assist discharged men, steps have been taken to acquire a lease of a building to provide professional accommodation for ex-service officers and to establish a company to provide financial assistance to medical practitioners desiring to purchase practices.

The trustees of the Medical Society during the year purchased a property in Albert Street, the necessary finance being provided by the British Medical Insurance Company and the British Medical Agency, and the site may some day become the headquarters of the Association in Victoria.

During the year the Branch Council gave its endorsement and support to the Bankers' Health Society, which provides a system of insurance against the costs of sickness to the community.

The new lodge capitation rates of 26s. per annum metropolitan and 32s. country, which were approved by the Prices Commissioner in 1944, came into operation on March 1, 1945.

The above references relate only to the major activities of the Council, the subcommittees and executive dealing with a great many minor matters.

Federal Council.

The Federal Council met in March and October in Melbourne. A full report of the proceedings of the March meeting appeared in THE MEDICAL JOURNAL OF AUSTRALIA of April 21, 1945, but there may be some delay in publication of the proceedings of the October meeting resulting from a strike of printers in New South Wales.

The Federal Council having decided to establish an Organization Fund, an appeal was issued to the members of the Branch resulting in contributions amounting to over £600.

The Branch Organization Fund, as was the case last year, contributed £604 to defray portion of the capitation fee of 15s. per member payable to the Federal Council.

The Library of the Medical Society of Victoria.

The library continues to render valuable service to members, and during the year many new books have been added.

Members of the Library Advisory Subcommittee are thanked for their assistance in the selection of new books.

Presentations to the library during the year have been made by the following, to whom our thanks are tendered: Australian College of Dentistry, Mr. H. Alexander (Town Clerk, South Melbourne), Dr. Burton Bradley, Department of Labour and National Service, Dr. H. C. Disher, Dr. Perry Ham, Dr. T. A. F. Heale, the Lady Gowrie Child Centre, the Editor of THE MEDICAL JOURNAL OF AUSTRALIA, Mrs. A. Natrass, Mr. T. E. L. Payne, New South Wales Branch, Royal Australasian College of Surgeons, Dr. Guy Springthorpe, Dr. W. G. D. Upjohn.

Melbourne Permanent Post-Graduate Committee.

The following is published at the request of the committee: After some years of relative inactivity due to the war, the Melbourne Permanent Post-Graduate Committee has considerably extended its organization in preparation for the release of some hundreds of medical officers from the services who have been divorced from civilian practice for a number of years.

A directorate has now been established in offices kindly granted by the Royal Australasian College of Surgeons in Spring Street, and various courses during the year have been well attended.

In 1946, commencing in February, continuous clinical refresher courses will be conducted throughout the year on four days of each week, in addition to continuous clinical instruction for the higher degrees and special diplomas and university courses designed for Part I of these qualifications. Twice during the year intensive refresher courses will be conducted for general practitioners.

The Council records its appreciation of the efficient work of the Medical Secretary and the office staff.

JOHN DALE, President.

ROY F. WATSON, Honorary Secretary.

C. H. DICKSON, Medical Secretary.

INSTALLATION OF THE PRESIDENT FOR 1946.

Dr. John Dale installed Professor P. MacCallum as President for the ensuing year. Professor MacCallum thanked the members for his election.

PRESIDENT'S ADDRESS.

Dr. John Dale then read his retiring president's address (see page 65). Professor MacCallum thanked Dr. Dale for his address.

RETIREMENT OF DR. C. H. MOLLISON FROM THE OFFICE OF HONORARY TREASURER.

Professor MacCallum referred to the unique services rendered by Dr. C. H. Mollison, who had retired from the office of honorary treasurer after holding it for fifty-three years. He said that the Branch Council had passed a special minute at its meeting a few days previously. It will be remembered that in 1943 Dr. Mollison was presented with the gold medal of the British Medical Association in Australia (see THE MEDICAL JOURNAL OF AUSTRALIA, October 2, 1943, page 285). Dr. Mollison's portrait has also been painted and is hung in the Medical Society Hall. The Council's special minute is as follows:

In accepting the resignation of Crawford Henry Mollison as honorary treasurer of the Medical Society of Victoria and of the Victorian Branch of the British Medical Association, an office held by him from 1892 to 1945, the Council records with gratitude its appreciation of the work he has performed on its behalf and on behalf of the members of the Association in Victoria. The esteem in which Dr. Mollison is held by his colleagues was recognized by the Federal Council when it awarded him the gold medal of the Association in 1943, and the medical profession and the people of Victoria owe him a great debt as the doyen of pathologists.

VOTES OF THANKS.

Dr. John Dale moved and Dr. F. L. Davies seconded a vote of thanks to the retiring members of the Council—Dr. D. M. Embelton, Dr. E. M. Ettelson and Dr. E. I. Littlejohn. Dr. Embelton, after twenty-four years of service on the Council, sent a farewell message which was read by Dr. Dale. The vote of thanks was carried by acclamation.

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held at the Children's Hospital, Carlton, Melbourne, on June 13, 1945, Dr. H. DOUGLAS STEPHENS, the Acting President, in the chair. Part of this report appeared in the issues of January 5 and January 12, 1946.

Scleroderma.

DR. L. WAIT showed a male child, aged six years, suffering from scleroderma. He had been admitted to the Queen's Memorial Infectious Diseases Hospital, Fairfield, on February 15, 1945, suffering from scarlet fever. On March 1 he developed acute nephritis. This was clearing satisfactorily, but on March 2 he had an exacerbation, with blood and albumin in the urine. There was a moderate degree of

oedema of the face and abdomen during this period, which lasted about three weeks. It was noted that when the oedema subsided the skin of the face and neck was tense. The kidney condition cleared satisfactorily. The child had large, unhealthy tonsils, for which tonsillectomy was performed on May 1. Culture from the tonsils yielded pure hemolytic streptococci. At this time the skin of the forearms and thighs was noticed to be hard and tense. There was no involvement of the muscles, and no pain or tenderness was present. The condition appeared to improve after tonsillectomy. Dr. Wait said that he was indebted to Dr. H. McLorin for these early notes of the case. When the boy came under Dr. Wait's care at the end of May, he appeared to be well and active. It was noted that generalized patchy hardness of the skin of the face, arms, forearms, buttocks, thighs and legs was present. The skin appeared thickened, but there was no limitation of movement at any of the joints. A mitral systolic bruit was audible. No abnormality could be detected on clinical examination of the lungs and abdomen. The urine was free from albumin and sugar. Dr. Arthur Day had been kind enough to see the patient, and considered that the skin on the right arm was becoming like ivory in appearance.

Dr. ARTHUR DAY said that he felt he was intruding, but when he had heard that Dr. Wait was showing a patient with widespread scleroderma, he thought the members would be glad to see also a patient presenting the localized form of the condition which was known as morphea. This was a male child, aged six years, and the patch of affected skin could be seen on the right side of the upper part of the abdomen.

Dr. H. McLORIN said that he had had Dr. Wait's patient under observation during the early stage of his illness. Dr. Mitchell had had extreme difficulty in removing the child's tonsils, as they were tough and tenacious. Since tonsillectomy the skin condition had remained fairly stationary, though it had progressed rapidly before this. In view of the part said to be played by sepsis, this observation might be significant.

Dr. J. W. GRIEVE said that his interest was stimulated by the definite relationship to streptococcal infection in this case. In cases of dermatomyositis previously presented, a similar relationship was also present.

Dr. Wait, in reply, said that difficulty might arise in differentiating between dermatomyositis and scleroderma. Dermatomyositis was characterized by widespread non-suppurative inflammation of muscles with oedema and dermatitis. The skin and subcutaneous tissues over the affected muscles were swollen and hardened by oedema. The muscular tissue was oedematous and yellowish and showed a variable amount of hemorrhage. Microscopic examination revealed extensive muscle degeneration and infiltration with inflammatory cells. In the later stages fibrosis occurred in the affected muscles. The spleen was enlarged and soft. Symptoms included moderate pyrexia and pain in the muscles of moderate to severe intensity. The joints were unaffected. The affected muscles were swollen and tender. If the respiratory muscles were involved, embarrassment to breathing might result. Speech might be affected, and dysphagia might also occur. Generalized oedema usually occurred at one stage. The skin was affected by a dusky erythema resembling erysipelas or *erythema nodosum*. Pigmentation might follow. The mortality rate was 50%. If the patient recovered, muscular atrophy and contractures might ensue. The characteristics were, briefly, oedema, multiple myositis, dermatitis and a relapsing type of pyrexia. Scleroderma occurred in two forms: (i) as single patches called morphea, (ii) as diffuse scleroderma. This was defined as a chronic affection in which the skin became altered in consistency and in colour. The affected parts became hard and rigid. Hard oedema first appeared, and after a time the swollen areas became shrunken and atrophic. Occasionally the induration subsided, but usually the slow atrophic contraction continued. The victim became hidebound. The face might be rendered immobile. The joints became fixed and the underlying muscles atrophied. Ulceration and calcinosis might follow. O'Leary, the dermatologist of the Mayo Clinic, had mentioned the difficulties in diagnosis in the early stages of the disease, especially between scleroderma and dermatomyositis. He had stated that scleroderma might come on about six weeks after an acute infection, such as acute streptococcal infections, influenza, tonsillitis or scarlet fever. He stated also that scleroderma had a tendency to undergo spontaneous involution over a period of three months or a year, but the course might be prolonged and relapses were not unusual. He believed that foreign protein in the form of typhoid vaccine was of value. Massage was of value

according to one authority. Dr. Day had achieved success in one case with "Iodolysin". X-ray therapy was dangerous.

Dr. Arthur Day, in reply, said that morphea was only one type of scleroderma. It was a circumscribed lesion and progressed or involuted irrespective of treatment. A clear description of the two types of scleroderma was given by Molesworth. Morphea characteristically appeared first as an erythema or as a telangiectasia. As it progressed, the central area became yellow and the surrounding areola took on a violaceous tint. The pathology was the same as in generalized scleroderma and was different from that of dermatomyositis. Most of the descriptions given dealt with the adult types of the disease. Dr. Day said that he had only seen two or three cases among adults at the Royal Melbourne Hospital, whereas he had encountered six or eight afflicted children. He was unaware of the ultimate fate of these patients. He had obtained some measure of success with "Iodolysin", but spontaneous improvement was well known. Pancreatic extracts and the various hormones had been tried in turn and in combination, as had electrolysis of the affected site or sites. One authority thought that X-ray therapy could be given with advantage, whereas Dr. Wait had quoted another authority who took the opposite view.

Public Health.

POST-WAR PLANS FOR NUTRITION IN CANADA.

The following statement on post-war plans for nutrition in Canada has been made by Dr. L. B. Pett, Canadian Director of Nutrition, Department of National Health and Welfare, Ottawa, before the New York State Legislative Committee on Nutrition on December 12, 1945. It has been received from the High Commissioner for Canada, Canberra.

Prior to the war nutrition work in Canada was relatively unorganized. There had been formed in 1937 a Canadian Council on Nutrition which sponsored a few dietary surveys on a total of about 1,500 people across Canada. There was also a certain amount of research work going on in relation to foods and nutrition, largely assisted by grants from our National Research Council. There was some research related to fisheries and fish products carried out chiefly in government experimental stations. Information about food was largely dependent upon a few interested individuals and a few writers for newspapers. Fairly rigid control of food standards and advertising claims is exercised by the Federal legislation on food and drugs. In spite of all this the field of nutrition was, as I have just said, uncoordinated.

With our entry into the war in 1939 there was a great outburst of activity in nutrition. The Canadian Medical Association, the Canadian Red Cross Society, the National Council of Women and many others greatly increased their activities; interested people in several cities established campaigns of popular education. These efforts gave an impetus and a momentum that carried right through the war and is still being felt. The immediate result was twofold: first, the services received very special attention to their food supplies both in Canada and abroad, and second, the whole field of civilian nutrition received more attention and became better organized.

One of our problems in Canada has been lack of trained personnel for nutrition work. Six years ago no one in all Canada was called a nutritionist or a nutrition expert; then suddenly every person who knew a little about food and nutrition or thought they did was besieged with requests to make speeches and participate in campaigns. In 1941 the Federal Division of Nutrition Services was established at Ottawa. Since Canada is a federation of what we call provinces, each with its own parliament and its own authority, federal work in this field has to depend to some extent on the establishment of provincial nutrition workers. At the present time six out of nine provinces have organized nutrition work to collaborate with the Federal division. It is still not possible to state clearly all the phases of the Canadian nutrition programme, because they differ considerably from one section of the country to another. In the time available and under the circumstances it will give a better general idea for me to concentrate on a brief description of the work of the Federal Division of Nutrition.

The Federal Division of Nutrition is in the Department of National Health and Welfare which corresponds to a limited extent to the United States Public Health Service. The Nutrition Division has had four clear fields of work:

1. *Consultation Work.*—The division provides expert advice on numerous nutritional matters both in Ottawa and else-

where. The division may give the advice directly or may serve as a clearing house, obtaining the advice from experts and from committees. This work will continue into the future as required and promises to demand a great deal of time.

2. Industrial Work.—The great expansion of war industries in Canada demanded measures to protect the health of employees, and these measures included the establishment and supervision of factory cafeterias by the Nutrition Division. At the peak of war employment the supervision given influenced the meals of more than 60% of all Canada's war workers. The Government gave some authority to this work so that it was possible to require the recommendations to be followed. Repeated inspections were carried out in order to make sure the desired standard was maintained. This work is being taken over to some extent by each province, and is being extended now on a voluntary basis not only to those industries who are interested, but also to some hospitals, orphanages, residential schools, penitentiaries, military and police barracks and other places. In fact, this advisory service will be extended directly and through the provinces to as many places as possible where groups of people must be fed, and where an interest is taken in doing the feeding properly in the interests of health.

3. Food Propaganda and Information. The information service is divided into two types, those that are not of a national scale for the general benefit of everyone in the country, and those that are in support of specific provincial needs, such as by the provision of free posters, films, pamphlets, speakers, demonstrations, displays *et cetera*. Many agencies are working in this field, and it cannot be claimed that coordination has greatly improved during the war, but the experience gained and the present trend is toward greater cooperation than ever before.

Food information from the Federal Division of Nutrition is developing in two other directions: (a) the sponsorship of special propaganda efforts for short periods of time, and (b) the study of food patterns and habits and the basis on which people develop food habits and also change them. An example of the former procedure is the sponsorship in each province of a competition for the design of a place mat in which the design is based on Canada's food rules. These place mats will be awarded prizes in each province and may be further developed by the division in connexion with school lunches.

4. Research.—The research section of the division is becoming the largest section of all, and this is a trend which will continue for some years. Research at the moment centres on food composition, especially the compilation of figures, and on the assessment of nutritional status of sections of the Canadian population. This latter function is not only to provide an indication of where our nutritional problems lie, but also to guide the information section in how to carry out its work on the basis of what is really needed. The research section is also very much interested in studying dietary standards and their relation to national food supplies. We have participated in the food consumption statistical studies of the Combined Food Board in association with the United States and Great Britain. In many ways Canada is a favoured land in respect to food supplies, nutrition problems and general welfare. Our food supplies throughout the war have been ample for health, even though they have been curtailed in certain directions. The statistical studies just referred to show that we do not need to worry so much about the amount of food that can be made available in Canada, but rather about its quality, especially when finally eaten. Our nutrition problem is not one of hunger or even of classical deficiency diseases. In part one of our common nutritional problems may be obesity. The only disease of nutritional origin that can be considered common in Canada in a severe form is rickets, and rickets causes less than one death per one hundred thousand people in the population per year. We have some cases of scurvy, but we rarely find a case of pellagra or beriberi. This means that our nutritional problem lies in that zone that must be examined by those vague and elusive signs of optimal nutrition that are mentioned in current research. The fact that we do have a few deaths every year from scurvy and from rickets which are classical nutritional diseases shows that there is a nutrition problem in Canada. The fact that we have found definite improvement in the health of groups that have been fed extra quantities of certain foods means that we have a definite need for the consumption of some desirable food in Canada. Work is progressing vigorously along this line so that we may understand more clearly where the problems lie and how to deal with them.

In conclusion, I would say that the war has given rise to considerable work in nutrition, which appears likely to continue and expand for some years to come.

The Royal Australasian College of Surgeons.

EXAMINATION FOR FELLOWSHIP.

The next examination for Fellowship of the Royal Australasian College of Surgeons will be held in June, 1946, when the new regulations governing the examinations for the diploma of Fellow will operate. Thereafter, examinations will be held half-yearly.

The substance of the appropriate regulations governing the examinations is as follows:

1. The examination will be in two parts, namely, a Primary and a Final.

2. Applications for permission to sit for the Primary and Final Examinations must be made on the appropriate form, which is available on application to the Secretary of the College.

3. All applicants for admission to the Primary Examination must be graduates of not less than one year's standing of a medical school approved by the Council.

4. The subjects for the Primary Examination will be (a) anatomy, including normal histology, and (b) physiology, including applied physiology and the principles of pathology. The examination will be partly written and partly oral, and both subjects must be passed at the one examination.

5. Candidates for the Primary Examination must produce evidence of having dissected at a recognized medical school for not less than fifty weeks.

6. The Council has power to exempt from the Primary Examination any candidate who has passed, not less than one year after graduation, an examination in anatomy and physiology of equal standard in an approved college or university.

7. Candidates for admission to the Final Examination shall be graduates of not less than five years of an approved medical school, university or college, and, in addition, must have (a) completed the Primary Examination, or have been granted an exemption therefrom by the Council; (b) undergone one year's training as a resident medical officer in an approved hospital; (c) completed a course of apprenticeship training approved by the Censor-in-Chief. All applicants for Fellowship in General Surgery must have acted for a period to be determined by the Censor-in-Chief as an assistant to an approved surgeon or surgeons in the operating theatres and wards of an approved hospital, or have undergone a period of equivalent training to the satisfaction of the Censor-in-Chief. All applicants for Fellowship in approved specialities must have, prior to the Final Examination, acted as an assistant to an approved general surgeon in the operating theatres and wards of an approved hospital for a period to be determined by the Censor-in-Chief, and also acted as an assistant to an approved surgeon in that speciality for a period to be determined by the Censor-in-Chief. Any of the conditions contained in item number 7 may be waived by the Censor-in-Chief, at his discretion, in the case of candidates who have returned from service with the armed forces.

8. The Censor-in-Chief of the College may reject the application of any candidate who, in his opinion, has not undergone a course of training sufficient to entitle him to present himself for examination. Any candidate rejected by the Censor-in-Chief has the right of appeal to the Council against his decision.

9. The subjects for the Final Examination will be: (a) general and surgical pathology; (b) the principles of surgery; (c) general surgery, or one of the following departments of surgery: (i) orthopaedics, (ii) gynaecology and operative obstetrics, (iii) urology, (iv) ophthalmology, (v) laryngo-otology. The examination will be partly written and partly oral and shall include the examination of patients and operative surgery.

The Primary Examination will be held concurrently at the College in Melbourne, Australia, and in New Zealand. The Final Examination will be held at the College in Melbourne, Australia.

Courses of studies for the subjects of the Final Examination will begin in Melbourne in March, 1946, and they are open to any graduate, whether desirous of presenting for a senior surgical qualification or not. Special arrangements may be made for graduates who are unable to attend to full course.

Forms of application, detailed copies of the regulations, and details of the courses may be obtained on application to the Secretary of the College.

Prospective candidates from States other than Victoria are referred to the Post-Graduate Committees in their respective States, and to the appropriate body in the Dominion of New Zealand.

The courses of study are designed for graduates wishing to obtain higher diplomas in surgery or in the surgical specialties and for the degree of Master of Surgery of the Australian universities.

Candidates intending to present themselves for examination in June, 1946, are advised to lodge their applications with the Censor-in-Chief of the Royal Australasian College of Surgeons, Spring Street, Melbourne, so as to reach him not later than January 31, 1946.

Medical Practice.

THE SUPPLY OF MOTOR-CARS.

FOLLOWING receipt of complaints from several members of the Victorian Branch of the British Medical Association that they have found it impossible to buy second-hand cars at "pegged" prices, representatives of the Branch Council waited upon the Deputy Prices Commissioner of Victoria and discussed the matter with him.

The Deputy Prices Commissioner expressed the hope that doctors would not in any way be parties to the "black marketing" of cars at more than pegged prices, and promised that prompt attention would be given to any cases of alleged overcharging reported to him. If necessary, where a would-be purchaser had reason to believe that the sale would not be effected unless at an excessive price, an officer of the Prices Branch would accompany the purchaser to the seller at the time and place arranged for finalizing the transaction. In all cases, the facts should first be reported fully and promptly to the Prices Branch, and members can be assured that the maximum action deemed appropriate in the particular circumstances reported will be taken.

If every case of attempted blackmarketing is brought under the notice of the Prices Branch in this manner, members will go a long way towards ensuring that they will be able to purchase second-hand cars at the correct prices.

Obituary.

DAVID HARDIE.

THE following appreciation of the late Sir David Hardie has been received from a correspondent who wishes to remain anonymous.

Queensland lost a senior practitioner with the death of Sir David Hardie on November 11, 1945, in his ninetieth year. The son of John Hardie, of Elgin, Scotland, he was born in 1856 and educated at the Aberdeen Grammar School and at King's College and Mareschal College, University of Aberdeen. He graduated Bachelor of Medicine and Master of Surgery in 1878, taking first prize in midwifery and in diseases of women and children. He proceeded to the degree of M.D. in 1887.

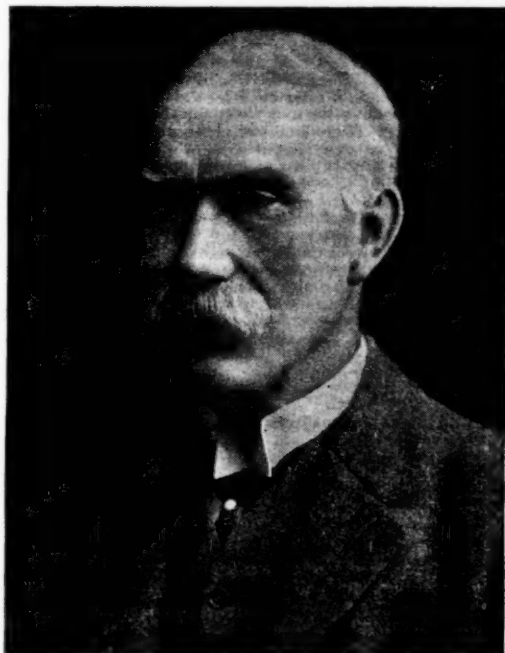
For two years after graduation he was attached to the university staff as demonstrator in anatomy, and then commenced practice at Forres, Scotland. Seven years later he decided to try his fortune in Australia, and, coming to Queensland in 1887, started to practise in Stanley Street, South Brisbane. Not long afterwards he moved to Wickham Terrace. He visited the Continent for what Osler would have called a "brain dusting" in 1895. Hardie soon occupied a prominent place in his profession. He was President of the Medical Society of Queensland in 1893 and 1899, its final year, before it became the Queensland Branch of the British Medical Association. Subsequently he was President of the Branch on two occasions, 1910 and 1920. He was for many years a member of the Central Board of Health and the Medical Board of Queensland, and for many years was honorary physician to the Hospital for Sick Children, the Lady Bowen and Lady Lamington Hospitals. He was knighted in 1913.

Hardie's extensive writings, mostly contributed to *The Australasian Medical Gazette*, include articles on acute yellow atrophy of the liver (1890), forceps in labour (1893), extra-

uterine pregnancy (1896), occipito-posterior presentation (1907), prophylaxis of puerperal eclampsia (1908), and the prevention of pelvic disease in women (1909).

The influence of climate on disease was always a fascinating subject to him. In 1893 he published a book entitled "Atmospheric Pathology of Queensland, 1887-1891", and a few years later articles on "Pneumonia in Relation to Atmospheric Conditions" and on the climatic treatment of consumption in south Queensland. His interest in this subject was still maintained a quarter of a century later when he contributed another article on heliotherapy after visiting Sir Henry Gauvain at Alton and the Rollier Clinic at Leysin in Switzerland. In 1921 he had written about the possibilities for the white race in tropical Australia—a subject still of extreme importance.

Sir David Hardie was a member of the Senate of the University of Queensland at the inaugural ceremony in 1911, with Sir William McGregor as Chancellor. While on the Senate he took a great interest in trying to establish a



medical school. Although his efforts were to fail at the time, the idea eventually bore fruit, and he lived to see the Medical School opened in 1934. He was a member of the Council of Emmanuel College from its opening in 1911 until he retired in 1940.

When the war came, Hardie went home in 1915 to join the Royal Army Medical Corps, with which he saw service in France. The degree of LL.D., Aberdeen, was conferred on him in 1919. From 1913 to 1944 he was a member of the Australasian Medical Publishing Company, Limited.

Returning to Queensland he took up his practice again, and in 1920 was elected President of the Australasian Medical Congress held in Brisbane. Two years later he retired from active professional work and revisited the Continent, part of his time being spent on an investigation into the treatment of tuberculosis at the request of the Queensland Government.

Sir David Hardie's life was lived to the full. In addition to his purely professional work he took a great interest in the aerial medical services of the Australian Inland Mission. As a staunch Presbyterian he was the first chairman of the Presbyterian and Methodist Schools' Association and was actively associated with Saint Paul's Church and Somerville House School. His main hobbies were photography, landscape gardening and the reading of historical works until his eyesight failed a year or two ago. A particular interest of his was the preparation of lantern slides from his own X-ray plates. He was one of the pioneers of motoring in Brisbane, driving a motor-car in

1903 and continuing to drive himself up to the age of eighty-five. One of the oldest personalities of the Queensland Club, at the time of his death he had been a member for 51 years.

In 1893 he married Marianne Jeans, daughter of Alexander Jeans, of Nairn, Scotland. He is survived by his wife, two daughters and one son.

ARTHUR HAY.

The following note on the late Dr. Arthur Hay has been received from Dr. J. H. B. Walsh, of Hobart.

The official list of prisoners lost in the sinking of the *Montevideo Maru* off New Guinea in June, 1942, contains the name of Dr. Arthur Hay, of the Islands Medical Service, and formerly of Scottsdale, Tasmania. Arthur Hay was stationed at Kavieng when the Japanese invaded New Guinea. Previous to this report, the last information that Mrs. Hay had received about her husband was contained in the following letter from a colleague:

I saw Ginger Hay at Bunopope Mission, Kokopu, on the morning of January 22nd (the Japs. attacked that day at dawn). He had arrived there the previous night with Dr. Hosking, Dr. Cooper, and most of the staff of the P.H. Dept. They took the few patients they had in Namanula to the mission hospital, together with the sisters. I believe he had only arrived in Rabaul a day or two before. He looked pretty fit, cheerful, and greeted me with his usual cheerful grin. I had decided to leave our patients and the army sisters at the mission before we left to join the rest of the troops at Toma. Ginger said: "You go and join the troops; we'll look after your patients, and good luck to you." Ginger told me he had been on his way south on leave, which was rotten luck for him, but I could not help being glad to see him, as he was a bright spot in an unpleasant situation. Not that the others weren't cheerful, but he was particularly reassuring and I was worried as to whether what I was doing was the best or not. I often remember the very pleasant time I had with him in Kavieng. You can assure Mrs. Hay that Ginger was cheerful and well when I last saw him.

EDWARD McDONALD.

We regret to announce the death of Dr. Edward McDonald, which occurred on January 6, 1946, at Bacchus Marsh, Victoria.

Medical Appointments.

Dr. G. Archbold and Dr. H. H. O'Connor have been respectively appointed Government Medical Officer at Tamworth and Morisset, New South Wales.

Dr. F. M. Burnet has been appointed a member of the Victorian State Committee of the Council for Scientific and Industrial Research, according to the provisions of the *Science and Industry Research Act, 1920-1939*.

Dr. J. R. Cornish, Dr. W. A. J. Nairn and Dr. G. W. Verco have been appointed honorary clinical assistants to the surgical section of the Royal Adelaide Hospital, Adelaide.

Dr. D. J. Oldmeadow has been appointed Medical Officer of Health, Broome Road Board, Western Australia.

Dr. H. D'A. Sutherland has been appointed Assistant Medical Superintendent (Surgical Section), Royal Adelaide Hospital, Adelaide.

Dr. T. W. Meagher has been appointed a member of the King's Park Board under the provisions of *The Parks and Reserves Act, 1895*, of Western Australia.

Dr. C. G. McDonald has been appointed a member of the New South Wales Medical Board.

Dr. E. W. Kyle has been appointed an examiner under the *Nurses Registration Act, 1921-1944*, of Western Australia.

The following have been appointed members of the honorary staff of the Wooroloo Sanatorium: Dr. J. G. Hislop, honorary consulting physician, Dr. A. Neave Kingsbury, honorary consulting pathologist, and Dr. R. Le Page Muecke, honorary consulting physician.

Dr. A. J. Metcalfe, Dr. C. C. Finlay and Dr. M. K. Blackall have been appointed members of the Nurses Registration Board of the Australian Capital Territory, under the *Nurses Registration Ordinance, 1933-1941*.

Dr. A. J. Metcalfe and Dr. J. A. James have been appointed members of the Medical Board of the Australian Capital Territory, under the *Medical Practitioners Registration Ordinance, 1930-1939*.

Books Received.

"Clinical Pathology", by P. N. Pantton, M.A., M.B., B.Chir. (Cantab.), J. R. Marrack, M.A., M.D. (Cantab.), and H. B. May, M.A., M.D. (Cantab.), M.R.C.P. (London). Fifth Edition; 1945. London: J. and A. Churchill Limited. 8 $\frac{1}{2}$ " x 5 $\frac{1}{2}$ ", pp. 460. Price: 21s.

"Tropical Nutrition and Dietetics", by Lucius Nicholls, M.D., B.C., B.A. (Cantab.); Second Edition; 1945. London: Baillière, Tindall and Cox. 8 $\frac{1}{2}$ " x 5 $\frac{1}{2}$ ", pp. 382, with illustrations. Price: 27s. 6d.

Diary for the Month.

- JAN. 22.—New South Wales Branch, B.M.A.: Council Meeting.
- JAN. 23.—Victorian Branch, B.M.A.: Council Meeting.
- JAN. 24.—South Australian Branch, B.M.A.: Council Meeting.
- JAN. 25.—Queensland Branch, B.M.A.: Council Meeting.
- JAN. 31.—South Australian Branch, B.M.A.: Scientific Meeting.
- FEB. 1.—Queensland Branch, B.M.A.: Branch Meeting.
- FEB. 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
- FEB. 6.—Victorian Branch, B.M.A.: Branch Meeting.
- FEB. 6.—Western Australian Branch, B.M.A.: Council Meeting.
- FEB. 7.—South Australian Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmalm United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All Public Health Department appointments.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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